REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
25/Jun/2001	MAJOR REPORT	

4. TITLE AND SUBTITLE
TOTAL MAXIMUM DAILY LOAD PROJECT FOR LOWER RAPID CREEK

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
CAPT DELL RONALD G

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
SOUTH DAKOTA SCHOOL OF MINES TECHNOLOGY

8. PERFORMING ORGANIZATION REPORT NUMBER
CI01-112

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
THE DEPARTMENT OF THE AIR FORCE
AFIT/CIA, BLDG 125
2950 P STREET
WPAFB OH 45433

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Unlimited distribution
In Accordance With AFI 35-205/AFIT Sup 1

13. SUPPLEMENTARY NOTES

14. ABSTRACT

20010720 010

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE		134	19b. TELEPHONE NUMBER *(Include area code)*

South Dakota School of Mines & Technology

Total Maximum Daily Load Project

for Lower Rapid Creek

Summary of Field Investigation Findings

Submitted to:

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By:

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Date: 12/18/00

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ABSTRACT

The purpose of this project was to establish a database that contained results from actual field samples that could be used to develop total maximum daily loads (TMDLs) for the Lower Rapid Creek Watershed. The collected data was compared to South Dakota Surface Water Quality Standards (SDSWQS) to determine if Lower Rapid Creek met the physical, chemical, and biological parameters set forth in the SDSWQS. Tables 1 through 8 in Appendix 1 list the parameters that were monitored, the sample results obtained for those parameters, and the SDSWQS used to determine if violations were detected at any of the eight representative sample sites. Any violation that was detected was then evaluated to determine the source(s) of the pollutant or contaminant.

INTRODUCTION

One of the more important and essential steps in water quality assessment of any stream or river is to conduct and evaluate actual sampling data on a variety of physical, chemical, and biological parameters along the stretch of the targeted water body. Selection of the location of sampling sites along the stretch of the targeted stream plays an important role in reflecting the actual existing water quality. The number of sampling sites depends on the location of point source and non-point source pollution, the types of contamination, the available previous sampling data, the physical characteristics of the stream, and any changes in the land use along the stretch of the study area. [2]

The primary goal of this field investigation was to conduct a watershed assessment along lower Rapid Creek that would characterize point and non-point sources of pollution. The collected water quality parameter data was to be used for identification and evaluation of

watershed management alternatives, and for the development of the TMDL for lower Rapid Creek. [3]

The project study area covers 328 square miles, and is subject to urban storm water runoff, irrigation withdrawals, return irrigation flows, wastewater treatment plant (WWTP) discharge, and runoff from agricultural areas. The reach below the WWTP is listed under impairment-related TMDL waters. To develop a realistic TMDL for lower Rapid Creek, the project must take on a watershed assessment approach recognizing the information needed for TMDL development. [3]

To be approved, each TMDL must include seven components; 1) target information, 2) identification of current deviation from target, 3) source identification, 4) allocation of pollutant loads, 5) implementation plan, 6) process for follow-up monitoring and assessment of effectiveness, and 7) process for TMDL revision. [3]

BACKGROUND

The first part of this research was aimed to develop a TMDL for lower Rapid Creek. It was declared by the South Dakota 1998 Total Maximum Daily Load Waterbodies (SD DENR, 1998) report that Rapid Creek below Rapid City to the mouth of the Cheyenne River is listed under impaired waters "section 305(b)" for priority watersheds. As a result, samples from eight designated sites along lower Rapid Creek were obtained and analyzed by a certified laboratory for a complete full year. Base-line sampling was conducted on regular four-week time intervals. Rain event, and snowmelt runoff sampling was conducted during different seasons of the year. This was an effective tool which has been used in this research to quantitatively assess any impairment factors and establish a water-quality based control system to reduce pollution from both point and non-point sources. As a result, concentrations and loads based on water quality

sampling analysis at each site for Lower Rapid Creek include base-line, rain event, and snowmelt runoff sampling, and were presented and superimposed on the South Dakota Surface Water Quality Standards (SDSWQS) to investigate the types of violations along the eight sampling sites of Lower Rapid Creek. [2]

Rapid Creek drains an area of about 700 square miles, and is a perennial stream that originates in the limestone plateau within the Black Hills, and flows eastward through Rapid City (see Figure 72 on next page). The upstream reach of Rapid Creek has an average gradient of about 48 feet per mile, and is comparatively narrow and fast running. The bed of the creek consists of sand, gravel, and cobbles derived from surrounding surface exposures of crystalline rock, sandstone, and limestone. Upstream and through Rapid City the stream is a fairly stable channel that is armored during low flows. At high flows, some bank erosion occurs that is controlled by either rock outcrops or stream bank vegetation. In Rapid City, Rapid Creek turns to the southeast and flows approximately 70 miles to the mouth of the Cheyenne River near Creston, South Dakota. Within this reach the gradient is about 13 feet per mile, and stream velocities are considerably less than the upstream reach. [3]

There have been numerous studies conducted, and large quantities of data collected over the years for various parameters, including conflicting results of water quality parameter concentrations for lower Rapid Creek. There was also evidence of inadequate flow data records, which are necessary to make realistic load calculations. [2]

One of the more important parameters in water quality assessment is dissolved oxygen (DO). The concentration of DO available is an indication of the overall health of a stream system. Sufficient DO is vital for the existence of aquatic organisms in the stream. [2]

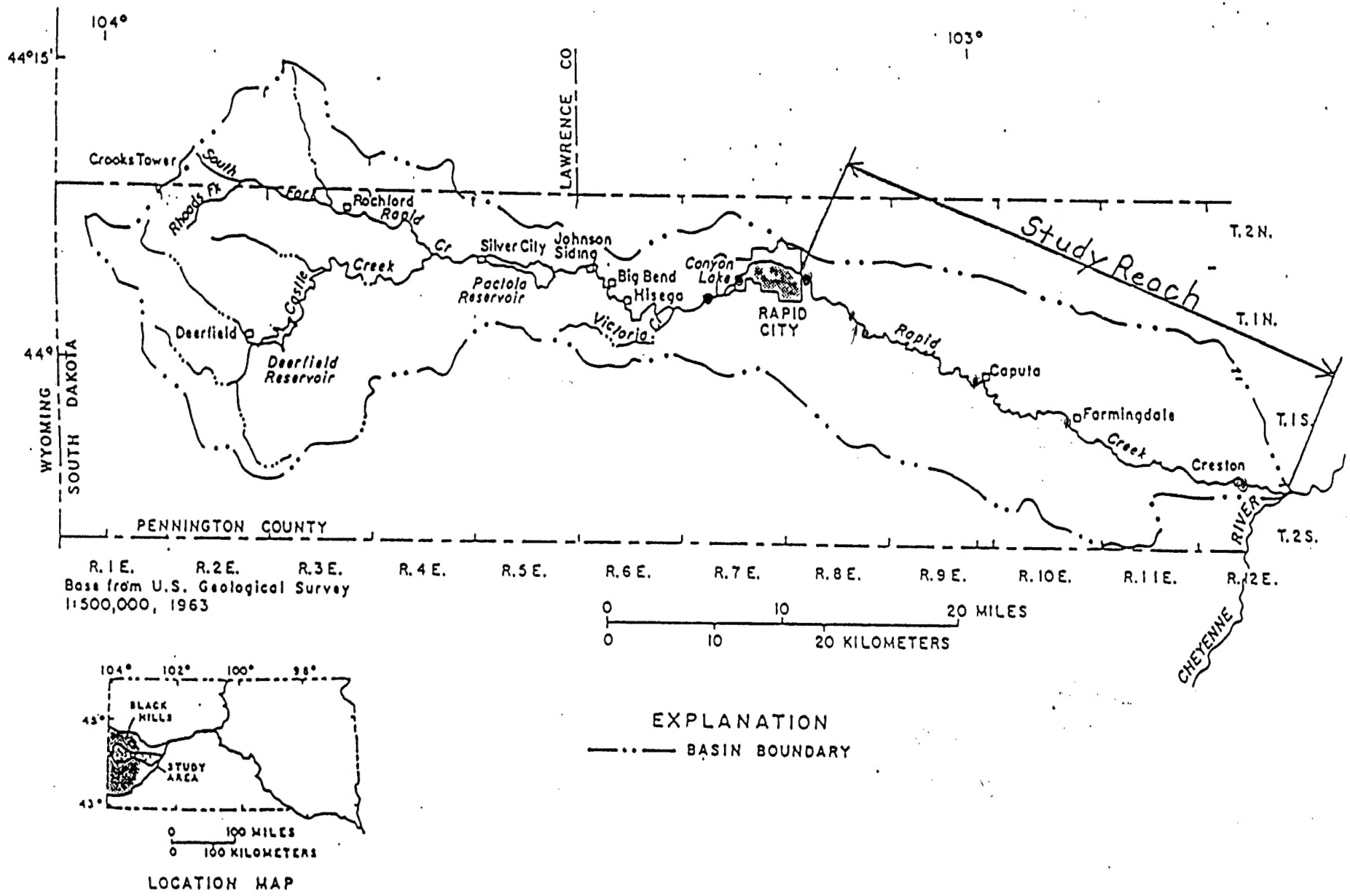

Figure 72--Location of Rapid Creek basin.

BENEFICIAL USES

The beneficial uses that apply to the lower Rapid Creek basin can be broken down into five classifications: domestic water supply waters; coldwater permanent fish life propagation waters; warm-water permanent fish life propagation waters; immersion recreation waters; and limited contact recreation waters. Each of these classifications is defined in the SDSWQS as follows:

(1) 1. Domestic water supply – a beneficial use assigned to waters of the state which are suitable for human consumption, culinary or food processing purposes, and other household purposes after suitable conventional treatment;

(2) 2. Coldwater permanent fish life propagation – a beneficial use assigned to surface waters of the state which support aquatic life and are suitable for stocked catchable-size coldwater fish during portions of the year, but which, because of critical natural conditions including low flows, siltation, or warm temperatures, are not suitable for a permanent coldwater fish population. Warm-water fish may also be present;

(3) 4. Warm-water permanent fish life propagation – a beneficial use assigned to surface waters of the state which support aquatic life and are suitable for the propagation or maintenance, or both, of warm-water fish but which may suffer occasional fish kills because of critical natural conditions;

(4) 7. Immersion recreation – a beneficial use assigned to surface waters of the state which are suitable for uses where the human body may come in direct contact with the water, to the point of complete submersion and where water may be accidentally ingested or where certain sensitive organs such as eyes, ears, and nose may be exposed to water;

(5) 8. Limited contact recreation – a beneficial use assigned to waters of the state which are suitable for boating, fishing, and other water-related recreation other than immersion recreation where a person's water contact would be limited to the extent that infections of eyes, ears, respiratory or digestive systems, or urogenital areas would normally be avoided. [1]

PARAMETER CRITERIA FOR BENEFICIAL USES

The following tables list the criteria for each beneficial use that was evaluated during this project. There were some parameters listed in the SDSQWS that were not monitored in this project. Parameters not monitored for beneficial use # 1 were Total Coliform, Barium, Chloride, Fluoride, Sulfate, and Total Petroleum Hydrocarbons. Parameters not monitored for beneficial use # 2 were Chlorides and Undisassociated Hydrogen Sulfide. The parameter not monitored for beneficial use # 4 was Undisassociated Hydrogen Sulfide. [1]

1. Criteria for Domestic Water Supply (Beneficial Use # 1)

Parameter	Criteria	Unit of Measure	Special Conditions
Total Dissolved Solids	1750	mg/L	Daily Maximum
Nitrates as N	10	mg/L	
pH	6.5 – 9.0	units	

Table 21. Beneficial use # 1 parameters sampled during the TMDL project for Rapid Creek.

2. Criteria for Coldwater Permanent Fish Life Propagation (Beneficial Use # 2)

Parameter	Criteria	Unit of Measure	Special Conditions
Unionized Ammonia Nitrogen as N	1.75 Times Criterion	mg/L	Daily Maximum
Dissolved Oxygen	6.0 7.0	mg/L mg/L	In Spawning Areas
pH	6.6 – 8.6	units	
Total Suspended Solids	53	/100 mL	Daily Maximum
Temperature	65	°F	

Table 22. Beneficial use # 2 parameters sampled during the TMDL project for Rapid Creek.

3. *Criteria for Warmwater Permanent Fish Life Propagation (Beneficial Use # 4)*

Parameter	Criteria	Unit of Measure	Special Conditions
Unionized Ammonia Nitrogen as N	1.75 Times Criterion	mg/L	Daily Maximum
Dissolved Oxygen	5.0	mg/L	
pH	6.5 – 9.0	units	
Total Suspended Solids	158	mg/L	Daily Maximum
Temperature	80	°F	

Table 23. Beneficial use # 4 parameters sampled during the TMDL project for Rapid Creek.

4. *Criteria for Immersion Recreation (Beneficial Use # 7)*

Parameter	Criteria	Unit of Measure	Special Conditions
Dissolved Oxygen	5.0	mg/L	
Fecal Coliform	400	/100 mL	In Any One Sample

Table 24. Beneficial use # 7 parameters sampled during the TMDL project for Rapid Creek.

5. *Criteria for Limited Contact Recreation (Beneficial Use # 8)*

Parameter	Criteria	Unit of Measure	Special Conditions
Dissolved Oxygen	5.0	mg/L	
Fecal Coliform	2000	/100 mL	In Any One Sample

Table 25. Beneficial use # 8 parameters sampled during the TMDL project for Rapid Creek.

RAPID CREEK BENEFICIAL USES

1. *Rapid Creek above Canyon Lake near Rapid City*

Rapid Creek, in the vicinity of the above Canyon Lake sampling site, was classified by the SDSWQS, Administrative Rules of South Dakota (ARSD), Chapters 74:51:03:02 and 74:51:03:17 and the beneficial uses of this site are:

1- Domestic water supply waters

2- Coldwater permanent fish life propagation waters

7- Immersion recreation waters

8- Limited-contact recreation water

All the parameters listed under each of the above beneficial uses as listed in the SDSWQS were graphed and superimposed on the actual sampling results to determine any violations in comparison with the Water Quality Standards.

2. Rapid Creek below Park Drive in Rapid City

Rapid Creek, in the vicinity of the below Park Drive sampling site, was classified by the SDSWQS, ARSD, Chapters 74:51:03:02 and 74:51:03:17 and the beneficial uses of this site are:

1- Domestic water supply waters

2- Coldwater permanent fish life propagation waters

7- Immersion recreation waters

8- Limited-contact recreation water

All the parameters listed under each of the above beneficial uses as listed in the SDSWQS were graphed and superimposed on the actual sampling results to determine any violations in comparison with the Water Quality Standards.

3. Rapid Creek below Hawthorn Ditch at Rapid City

Rapid Creek, in the vicinity of the below Hawthorn Ditch sampling site, was classified by the SDSWQS, ARSD, Chapters 74:51:03:02 and 74:51:03:17 and the beneficial uses of this site are:

1
2 4- Warm-water permanent fish life propagation waters
7 7- Immersion recreation waters
8 8- Limited-contact recreation water

All the parameters listed under each of the above beneficial uses as listed in the SDSWQS were graphed and superimposed on the actual sampling results to determine any violations in comparison with the Water Quality Standards.

4. Rapid Creek above Wastewater Treatment Plant near Rapid City

Rapid Creek, in the vicinity of the above WWTP sampling site, was classified by the SDSWQS, ARSD, Chapters 74:51:03:02 and 74:51:03:17 and the beneficial uses of this site are:

4- Warm-water permanent fish life propagation waters

7- Immersion recreation waters

8- Limited-contact recreation water

All the parameters listed under each of the above beneficial uses as listed in the SDSWQS were graphed and superimposed on the actual sampling results to determine any violations in comparison with the Water Quality Standards.

5. Rapid Creek below the Wastewater Treatment Plant near Rapid City

Rapid Creek, in the vicinity of the below WWTP sampling site, was classified by the SDSWQS, ARSD, Chapters 74:51:03:02 and 74:51:03:17 and the beneficial uses of this site are:

4- Warm-water permanent fish life propagation waters

7- Immersion recreation waters

8- Limited-contact recreation water

All the parameters listed under each of the above beneficial uses as listed in the SDSWQS were graphed and superimposed on the actual sampling results to determine any violations in comparison with the Water Quality Standards.

6. Rapid Creek near Caputa, SD

Rapid Creek, in the vicinity of the near Caputa sampling site, was classified by the SDSWQS, ARSD, Chapters 74:51:03:02 and 74:51:03:17 and the beneficial uses of this site are:

4- Warm-water permanent fish life propagation waters

7- Immersion recreation waters

8- Limited-contact recreation water

All the parameters listed under each of the above beneficial uses as listed in the SDSWQS were graphed and superimposed on the actual sampling results to determine any violations in comparison with the Water Quality Standards.

7. Rapid Creek near Farmingdale, SD

Rapid Creek, in the vicinity of the near Farmingdale sampling site, was classified by the SDSWQS, ARSD, Chapters 74:51:03:02 and 74:51:03:17 and the beneficial uses of this site are:

4- Warm-water permanent fish life propagation waters

7- Immersion recreation waters

8- Limited-contact recreation water

All the parameters listed under each of the above beneficial uses as listed in the SDSWQS were graphed and superimposed on the actual sampling results to determine any violations in comparison with the Water Quality Standards.

8. Rapid Creek near Creston, SD

Rapid Creek, in the vicinity of the near Creston sampling site, was classified by the SDSWQS, ARSD, Chapters 74:51:03:02 and 74:51:03:17 and the beneficial uses of this site are:

4- Warm-water permanent fish life propagation waters

7- Immersion recreation waters

8- Limited-contact recreation water

All the parameters listed under each of the above beneficial uses as listed in the SDSWQS were graphed and superimposed on the actual sampling results to determine any violations in comparison with the Water Quality Standards.

LOAD CALCULATIONS

Load calculations were made using the following formulas in Tables 1 through 8 in Appendix 1, with the value of 5.39 being used to account for the unit conversions:

WQS Daily Max (Lb/day) = [Discharge (cfs)][WQS Daily Max (mg/L)](5.39)

Load (Lb/day) = [Discharge (cfs)][Concentration (mg/L)](5.39)

Lb/day = $(ft^3/s)(mg/L)[(10^{-3}\ Kg/m^3)/(mg/L)][(0.20482\ Lb/ft^2)/(Kg/m^2)](1\ m/3.281\ ft)(86{,}400\ s/d) = 5.39$

Table 60 in Appendix 3 lists the TSS loads that violated the SDSWQS. Appendix 3 also shows plots of the percent increase in TSS loads from site to site, starting upstream and continuing through the reach of lower Rapid Creek. The plots show that during baseline sampling the TSS load continually increases throughout the reach of the study area. The event plots tend to indicate that the event samples were not always captured during the peak flows, because these plots show a decrease in TSS load from an upstream site to a more downstream sample site.

Appendix 4 lists the flow measurements that were taken for all of the samples that exceeded SDSWQS parameters. Also included in Appendix 4 are plots of the discharge measurements taken across the study area reach, and separated by type of event samples or baseline samples.

FINDINGS

1. Findings on Rapid Creek at the above Canyon Lake sampling site:

One violation on water temperature occurred during the sampling on 8/11/2000. The water temperature exceeded the SDSWQS. This water temperature violation occurred during a

heavy rain event sampling. The increase in water temperature can be related to the warm ground temperature during that summer day.

No other violations existed during the sampling period. The plot of the violation for this site is presented in Appendix 2.

2. Findings on Rapid Creek at the below Park Drive sampling site:

(1) Concentrations and loads of total suspended solids were violated during a heavy rain event sampling on 8/11/2000. The main cause of this violation was due to some building construction activities taking place within just half a mile of the sampling site.

(2) Water temperature exceeded the SDSWQS in the same manner as the previous site for the same sampling day (8/11/2000).

No other Violations existed during the sampling period. The plots of the violations for this site are presented in Appendix 2.

3. Findings on Rapid Creek at the below Hawthorn Ditch sampling site:

(1) Concentrations and loads of total suspended solids were violated during a snowmelt runoff event sampling on 4/21/2000. The snowmelt occurred after four consecutive days of continuous snowstorm, over four feet of snow accumulated in the City of Rapid City during that week.

(2) Concentration and loads of total suspended solids were violated during a heavy rain event sampling on 8/11/2000.

(3) Fecal coliform violated the SDSWQS during a regular base-line sampling on 8/3 /2000.

(4) Water temperature exceeded the SDSWQS during a heavy rain event sampling on 8/11/2000.

(5) Fecal coliform violated the SDSWQS during a heavy rain event sampling on 8/11/2000.

(6) Dissolved oxygen was below the SDSWQS during a heavy rain event sampling on 8/11/2000.

No other Violations existed during the sampling period. The plots of the violations for this site are presented in Appendix 2.

4. Findings on Rapid Creek at the above Wastewater Treatment Plant sampling site

(1) Fecal coliform violated the SDSWQS during a snowmelt event sampling on 4/21/2000.

(2) Fecal coliform violated the SDSWQS during a snowmelt event sampling on 4/25/2000.

(3) Fecal coliform violated both beneficial uses # 7 and # 8 during a regular base-line sampling on 8/3/2000.

(4) Fecal coliform violated both beneficial uses # 7and # 8 on 8/12/2000. It is worth mentioning that fecal coliform was noticeably high up to 490,000 CFU/ml during a rain event sampling.

It is clear that Fecal Coliform was a major violation at this site, especially during snowmelt runoff and rain events. It is worth mentioning that a hog farm exists less than half a mile from this sampling site, which might be a contributor source for the high level of fecal coliform.

No other Violations existed during the sampling period. The plots of the violations for this site are presented in Appendix 2.

5. Findings on Rapid Creek below Wastewater Treatment Plant sampling site

(1) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 10/27/1999 during a regular base-line sampling. The count of fecal coliform was too numerous to count as presented in the laboratory report.

(2) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 11/17/2000 during a regular base-line sampling.

(3) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 12/14/2000 during a regular base-line sampling.

(4) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 2/1/2000 during a regular base-line sampling.

(5) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 2/29/2000 during a regular base-line sampling.

(6) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 3/28/2000 during a regular base-line sampling.

(7) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 4/25/2000 during a snowmelt event sampling.

(8) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 8/3/2000 during a regular base-line sampling.

(9) Fecal coliform exceeded the SDSWQS for beneficial uses # 7 and # 8 on 8/12/2000 during a heavy rain event sampling.

(10) Fecal coliform exceeded the SDSWQS for beneficial use # 7 on 8/31/2000 during a base-line sampling.

It is clear that fecal coliform below the Wastewater Treatment Plant exceeded the Water Quality Standards for most of the time during the sampling period. The fecal coliform counts were higher during event sampling in comparison with the base-line sampling periods. No other violations existed during the sampling period. The plots of the violations for this site are presented in Appendix 2.

6. Findings on Rapid Creek at the near Caputa sampling site

(1) Concentrations and loads of total suspended solids were violated during a snowmelt runoff event sampling on 4/21/200.

(2) Concentration and loads of total suspended solids were violated during a snowmelt runoff event sampling on 4/25/2000.

(3) Fecal coliform violated the SDSWQS for beneficial use # 7 during a regular base-line sampling on 12/14/2000.

(4) Fecal coliform violated the SDSWQS for beneficial use # 7 during a regular base-line sampling on 1/5/2000.

(5) Fecal coliform violated the SDSWQS for beneficial uses # 7 and # 8 on 4/21/2000 during a snowmelt event sampling.

(6) Fecal coliform violated the SDSWQS for beneficial uses # 7 and # 8 on 4/25/2000 during a snowmelt event sampling.

(7) Fecal coliform violated the SDSWQS for beneficial use # 7 during a regular base-line sampling on 6/28/2000.

(8) Fecal coliform violated the SDSWQS for beneficial uses # 7and # 8 on 8/3/2000 during a regular base-line sampling.

(9) Fecal coliform violated the SDSWQS for beneficial use # 7 on 8/12/2000 during a snowmelt event sampling.

The fecal coliform counts were higher during event sampling in comparison with the base-line sampling periods. No other violations existed during the sampling period. The plots of the violations for this site are presented in Appendix 2.

7. Findings on Rapid Creek at the near Farmingdale sampling site

(1) Concentrations and loads of total suspended solids were violated on 3/28/200 during a regular base-line sampling.

(2) Concentration and loads of total suspended solids were violated on 4/21/2000 during a snowmelt runoff event sampling.

(3) Fecal coliform violated the SDSWQS for beneficial uses # 7 and # 8 on 4/21/2000 during a snowmelt runoff event sampling.

(4) Fecal coliform violated the SDSWQS for beneficial uses # 7 and # 8 on 4/25/2000 during a snowmelt runoff event sampling.

No other violations existed during the sampling period. The plots of the violations for this site are presented in Appendix 2.

8. Findings on Rapid Creek at the near Creston sampling site

(1) Concentrations and loads of total suspended solids were violated during a snowmelt event sampling on 4/25/2000.

(2) Concentration and loads of total suspended solids were violated during a regular base-line sampling on 5/9/2000.

(3) Concentration and loads of total suspended solids were violated during a regular base-line sampling on 6/28/2000.

(4) Concentration and loads of total suspended solids were violated during a regular base-line sampling on 8/3/2000.

(5) Fecal coliform violated the SDSWQS for beneficial use # 7 on 4/21/2000 during a snowmelt runoff event sampling.

(6) Fecal coliform violated the SDSWQS for beneficial uses # 7 and # 8 on 4/25/2000 during a snowmelt runoff event sampling.

(7) Fecal coliform violated the SDSWQS for beneficial uses # 7 and # 8 on 8/3/2000 during a regular base-line sampling.

No other violations existed during the sampling period. The plots of the violations for this site are presented in Appendix 2.

DISCUSSION OF FINDINGS

The following conclusions were drawn from this yearlong sampling effort.

1. No significant changes occurred in the measured water quality parameters between the above Canyon Lake and below Park Drive sampling sites. During a heavy rain event, total suspended solids exceeded the SDSWQS at the below Park Drive sampling site, which was clearly related to building construction activities taking place just a half-mile upstream from this sampling site.

2. By comparison of concentrations and loads between the above Canyon Lake and below Park Drive sampling sites, it was clear that the impact of the Cleghorn Spring Fish Hatchery as point source pollution was insignificant. This is related to the fact that Canyon Lake, which is located between the two sampling sites, acts as a nutrient sink, and reduces the nutrient loads in Rapid Creek for different constituents (Brown, K. 1988, Delzar, G 1993). [2]

Did our data show this ? for what parameter

3. From the results of the sampling analysis of concentrations and loads for the eight sampling sites, it can be concluded that the portion of Lower Rapid Creek between above Canyon Lake and below Park Drive sampling sites was the main part of the creek that complied completely with the SDSWQS during the period of the base-line sampling. From the water

quality perspective, this portion of the creek can be considered as the healthiest part of the Lower Rapid Creek study area.

4. Below Park Drive sampling site was exposed to very little quantities of pollutants during runoff events, while the urban sampling site (below Hawthorn Ditch) was exposed to large amounts.

5. As Rapid Creek meanders through Rapid City, the water quality analysis for the below Hawthorn Ditch sampling site presented a noticeable degradation in water quality in comparison with the SDSWQS. A significant change in the water quality of Rapid Creek occurred below Hawthorn Ditch sampling site. The transition of the dominant land-use between the previous sampling sites and the below Hawthorn Ditch sampling site established a significant impact on the water quality. The area above the Canyon Lake sampling site presents forestry as the dominant land-use in terms of flow and water quality, with the difference in water quality at below Hawthorn Ditch sampling site, which represents urban land-use contributions.

6. The impact of urban land-use at the below Hawthorn Ditch sampling site during snowmelt runoff and rain events made abrupt water quality changes. Concentrations and loads of water quality samples violated the SDSWQS for the warm-water permanent fish life propagation waters, and for immersion recreation waters. The total suspended solids concentration and fecal coliform counts exceeded the SDSWQS criteria at the below Hawthorn Ditch sampling site.

7. The major pollution inputs from urban land-use, and land disturbance during development, especially on hilly sites as it was common in the new residential developments in Rapid City, frequently can be a main cause of large inputs of total suspended solids into Rapid Creek at the below Hawthorn Ditch sampling site. Other factors such as storm intensity, and geologic characteristics can also be concluded to influence these findings. Runoff from roads,

parking lots, lawns, parks, golf courses and other urban areas play a significant role in the difference of water quality in comparison with the sampling sites above Canyon Lake and below Park Drive.

8. At the Above Wastewater Treatment Plant sampling site, fecal coliform was recognized from the sampling analysis as the major violation for the immersion recreation waters and the limited contact recreation water for SDSWQS. The exceeding counts of fecal coliform increased during runoff event sampling in comparison to the exceeding values during base-line sampling. It is suspected that this was due to runoff from small feedlots located near the stream and within less than half a mile of this sampling site.

9. During this research, over 80% of the times where sampling took place at the site below the Wastewater Treatment Plant, counts of fecal coliform violated the SDSWQS for both beneficial uses of immersion recreation waters and the limited contact recreation waters. This supports a strong argument that the Wastewater Treatment Plant effluent to Rapid Creek contributes an excessive count of fecal coliform in comparison with the fecal coliform measured at the above Wastewater Treatment Plant sampling site, which is less than half a mile upstream from this site.

10. In the agricultural and rangeland areas such as Caputa, Farmingdale, and Creston, violations of the SDSWQS were among the beneficial uses warm-water permanent fish life propagation waters, immersion recreation waters, and limited contact recreation waters. During baseline, rain event, and snowmelt runoff sampling, total suspended solids and fecal coliform counts were the major contributors to such violations. The TSS load can be mainly attributed to bank erosion. The fecal coliform violations can be attributed to the livestock that use Rapid Creek either near of at these sampling sites.

BEST MANAGEMENT PRACTICES

As a result of the TMDL analysis presented in this report and in comparison with the SDSWQS, the major violations in the Lower Rapid Creek study area are total suspended solids and fecal coliform.

According to the TMDL calculations, and the plots presented in the appendices, it is evident that the reach below the Hawthorn Ditch sampling site to the mouth of the Cheyenne River at Creston was in violation of the SDSWQS for beneficial uses # 4 (warm-water permanent fish life propagation waters), # 7 (immersion recreation waters), and # 8 (limited contact recreation waters).

The greatest impact of the TSS loads on Rapid Creek was measured during the event sampling for the stations from Above Canyon Lake to Below Hawthorn Ditch. This clearly shows that the pollution was directly related to storm runoff in Rapid City.

Visual assessment by tubing through the creek during the summer of 2000 provided more insight to the best management practice that can be implemented to restore the water quality in Lower Rapid Creek. The following observations were recorded:

1- The majority of the storm sewer systems in Rapid City discharge into Rapid Creek.

2- All drainage in Rapid City flows into Rapid Creek, this is a major source of the pollutants that can cause water quality degradation.

3- Major storm-water outfalls may discharge significant sediment loading to the creek.

4- Bank erosion is evident in many locations along the stretch of the study area especially below the Wastewater Treatment Plant, Caputa, and Creston sampling sites.

5- Feedlots are located near the creek, which are a significant contributor to fecal coliform counts during runoff and snowmelt.

6- It was noticed many times during the sampling routine, that cattle, horses, and other animals were inside the creek at Caputa, and Creston sampling sites.

For restoring the water quality in Lower Rapid Creek, and to minimize the water quality violations mentioned above, the following alternative solutions of best management practice should be implemented:

1- Implementing bank stabilization. Constructing off-stream sediment retention facilities where feasible. This can be accomplished by installing big rocks at waterlines, or terraces of earthen embankment above the water line in the steep areas.

2- Vegetation Management. Vegetation plays a significant role in reducing sediment loading. Establish landscapes using native species that best suite the current hydrologic and soil conditions in the area. Restore buffer strips of low height vegetation within sufficient distances along the stream banks.

3- Storm Detention Structures. Assemble low earthen dikes with control outlets and emergency overflow structures with rigid and stable foundations. Construct infiltration basins, trenches, dry wells, and wet lands to trap sediment and pollutants.

4- Fencing off the riparian zone to exclude cattle from entering the creek. In some areas surrounding the creek it is recommended to be fenced in order to provide a sufficient buffer zone between grazing land and the stream.

5- Below the Wastewater Treatment Plant sampling site, fecal coliform exceeded the water quality standards for the designated beneficial uses over 80% of the sampling period. Since the sampling site above the Wastewater Treatment Plant, is less than a

half-mile upstream, and shows significantly lower fecal coliform counts, it is recommended that the Wastewater Treatment Plant discharge permit be reviewed concerning fecal coliform control, and to improve the quality of effluent. [2]

REFERENCES

1. South Dakota Surface Water Quality Standards, 1999, Article 74:51, "Surface Water-Quality."
2. Ziadat, Anf H., 2000, "Lower Rapid Creek Water Quality Assessment," South Dakota School of Mines and Technology Dissertation Proposal.
3. South Dakota School of Mines and Technology, 1999, "Grant Agreement for the Lower Rapid Creek Watershed Assessment and TMDL Development," Exhibit A.

APPENDIX 1

Location	Station	Date	WQS TDS (mg/L) For B.Uses #1 30 Day Av.	WQS TDS (mg/L) For B.Uses #1 Daily Max.	WQS Nitrates as N For B.Uses #1(mg/L)	WQS Nitrates as N Load For B.Uses #1 (Lb/day)	WQS Total Coliform For B.Uses #1(mg/L) Geo. Mean
Rapid Creek above Canyon Lake	06412500	9/1/1999	1000.00	1750.0	10.0	9380	5000/100mL
Rapid Creek above Canyon Lake	06412500	10/6/1999	1000.00	1750.0	10.0	2022	5000/100mL
Rapid Creek above Canyon Lake	06412500	10/27/1999	1000.00	1750.0	10.0	1510	5000/100mL
Rapid Creek above Canyon Lake	06412500	11/17/1999	1000.00	1750.0	10.0	1456	5000/100mL
Rapid Creek above Canyon Lake	06412500	12/14/1999	1000.00	1750.0	10.0	4151	5000/100mL
Rapid Creek above Canyon Lake	06412500	1/5/2000	1000.00	1750.0	10.0	3666	5000/100mL
Rapid Creek above Canyon Lake	06412500	2/1/2000	1000.00	1750.0	10.0	2480	5000/100mL
Rapid Creek above Canyon Lake	06412500	2/29/2000	1000.00	1750.0	10.0	3342	5000/100mL
Rapid Creek above Canyon Lake	6412500	3/28/2000	1000.00	1750.0	10.0	3342	5000/100mL
Rapid Creek above Canyon Lake	06412500	4/21/2000	1000.00	1750.0	10.0	4205	5000/100mL
Rapid Creek above Canyon Lake	06412500	4/25/2000	1000.00	1750.0	10.0	7332	5000/100mL
Rapid Creek above Canyon Lake	06412500	5/9/2000	1000.00	1750.0	10.0	7149	5000/100mL
Rapid Creek above Canyon Lake	06412500	6/28/2000	1000.00	1750.0	10.0	4852	5000/100mL
Rapid Creek above Canyon Lake	06412500	8/3/2000	1000.00	1750.0	10.0	3585	5000/100mL
Rapid Creek above Canyon Lake	06412500	8/11/2000	1000.00	1750.0	10.0	2857	5000/100mL
Rapid Creek above Canyon Lake	06412500	8/31/2000	1000.00	1750.0	10.0	2803	5000/100mL
Rapid Creek above Canyon Lake	06412501	11/1/2000	1000.00	1750.0	10.0	1563	5000/100mL

Table 1. Analysis Data for Lower Rapid Creek Above Canyon Lake.

Date	WQS Total Coliform For B.Uses #1 (mg/L) in any Sample	WQS pH For B.Uses #1	WQS pH For B.Uses #1	WQS TDS LOAD (Lb/day) For B.Uses #1 30 Day Av.	WQS TDS LOAD (Lb/day) For B.Uses #1 Day Max..	WQS Un-ionized ammonia as N, For B.Uses #2 30 Day Av. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #2 30 Day Av. (Lb/day)
9/1/1999	20000/100mL	6.5	6.5 - 9.0	938048	1641584	0.02	18.76
10/6/1999	20000/100mL	6.5	6.5 - 9.0	202165	353790	0.02	4.04
10/27/1999	20000/100mL	6.5	6.5 - 9.0	150950	264163	0.02	3.02
11/17/1999	20000/100mL	6.5	6.5 - 9.0	145559	254729	0.02	2.91
12/14/1999	20000/100mL	6.5	6.5 - 9.0	415113	726448	0.02	8.30
1/5/2000	20000/100mL	6.5	6.5 - 9.0	366593	641538	0.02	7.33
2/1/2000	20000/100mL	6.5	6.5 - 9.0	247990	433982	0.02	4.96
2/29/2000	20000/100mL	6.5	6.5 - 9.0	334247	584932	0.02	6.68
3/28/2000	20000/100mL	6.5	6.5 - 9.0	334247	598959	0.02	6.68
4/21/2000	20000/100mL	6.5	6.5 - 9.0	420504	753529	0.02	8.41
4/25/2000	20000/100mL	6.5	6.5 - 9.0	733187	1313846	0.02	14.66
5/9/2000	20000/100mL	6.5	6.5 - 9.0	714857	1281000	0.02	14.30
6/28/2000	20000/100mL	6.5	6.5 - 9.0	485197	869457	0.02	9.70
8/3/2000	20000/100mL	6.5	6.5 - 9.0	358507	642432	0.02	7.17
8/11/2000	20000/100mL	6.5	6.5 - 9.0	285727	512014	0.02	5.71
8/31/2000	20000/100mL	6.5	6.5 - 9.0	280336	502353	0.02	5.61
11/1/2000	20000/100mL	6.5	6.5 - 9.0	156341	280158	0.02	3.13

Table 1. Analysis Data for Lower Rapid Creek Above Canyon Lake.

Date	WQS Un-ionized ammonia as N, For B.Uses #2 Daily Max. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #2 Daily Max. (Lb/day)	WQS Dissolved Oxygen For B.Uses#2 (mg/L)	WQS pH For B.Uses #2	WQS pH For B.Uses #2	WQS TSS (mg/L) 30 Day Av. For B.Uses #2	WQS TSS, LOAD(Lb/day) 30 Day Av. For B.Uses #2
9/1/1999	0.0359	34	6.0	6.6	6.6 - 8.6	30	28141
10/6/1999	0.0361	7	7.0	6.6	6.6 - 8.6	30	6065
10/27/1999	0.0360	5	7.0	6.6	6.6 - 8.6	30	4529
11/17/1999	0.0361	5	7.0	6.6	6.6 - 8.6	30	4367
12/14/1999	0.0363	15	6.0	6.6	6.6 - 8.6	30	12453
1/5/2000	0.0361	13	6.0	6.6	6.6 - 8.6	30	10998
2/1/2000	0.0358	9	6.0	6.6	6.6 - 8.6	30	7440
2/29/2000	0.0362	12	6.0	6.6	6.6 - 8.6	30	10027
3/28/2000	0.0360	12	6.0	6.6	6.6 - 8.6	30	10027
4/21/2000	0.0358	15	6.0	6.6	6.6 - 8.6	30	12615
4/25/2000	0.0361	26	6.0	6.6	6.6 - 8.6	30	21996
5/9/2000	0.0360	26	6.0	6.6	6.6 - 8.6	30	21446
6/28/2000	0.0359	17	6.0	6.6	6.6 - 8.6	30	14556
8/3/2000	0.0360	13	6.0	6.6	6.6 - 8.6	30	10755
8/11/2000	0.0365	10	6.0	6.6	6.6 - 8.6	30	8572
8/31/2000	0.0332	9	6.0	6.6	6.6 - 8.6	30	8410
11/1/2000	0.0157	2	6.0	6.6	6.6 - 8.6	30	4690

Table 1. Analysis Data for Lower Rapid Creek Above Canyon Lake.

Date	WQS TSS (mg/L) Daily Max. For B.Uses #2	WQS TSS, LOAD (Lb/day) Daily Max. For B.Uses #2	WQS Water Temp, Deg F, For B.Uses #2	WQS Water Temp, Deg C, For B.Uses #2	WQS Dissolved Oxygen (mg/L) For B.Uses #7	WQS Fecal Coliform (from May - Sept. 30) Geo.Mean For B.Uses #7	WQS Fecal Coliform In any One Sample. For B.Uses #7 and #8	WQS Dissolved Oxygen (mg/L) For B.Uses # 8
9/1/1999	53	49717	65	18.41	5.0	200/100mL	400	5.00
10/6/1999	53	10715	65	18.41	5.0	200/100mL	400	5.00
10/27/1999	53	8000	65	18.41	5.0	200/100mL	400	5.00
11/17/1999	53	7715	65	18.41	5.0	200/100mL	400	5.00
12/14/1999	53	22001	65	18.41	5.0	200/100mL	400	5.00
1/5/2000	53	19429	65	18.41	5.0	200/100mL	400	5.00
2/1/2000	53	13143	65	18.41	5.0	200/100mL	400	5.00
2/29/2000	53	17715	65	18.41	5.0	200/100mL	400	5.00
3/28/2000	53	17715	65	18.41	5.0	200/100mL	400	5.00
4/21/2000	53	22287	65	18.41	5.0	200/100mL	400	5.00
4/25/2000	53	38859	65	18.41	5.0	200/100mL	400	5.00
5/9/2000	53	37887	65	18.41	5.0	200/100mL	400	5.00
6/28/2000	53	25715	65	18.41	5.0	200/100mL	400	5.00
8/3/2000	53	19001	65	18.41	5.0	200/100mL	400	5.00
8/11/2000	53	15144	65	18.41	5.0	200/100mL	400	5.00
8/31/2000	53	14858	65	18.41	5.0	200/100mL	400	5.00
11/1/2000	53	8286	65	18.41	5.0	200/100mL	400	5.00

Table 1. Analysis Data for Lower Rapid Creek Above Canyon Lake.

Date	WQS Fecal Coliform (from May - Sept. 30) Geo.Mean For B.Uses # 8	WQS Fecal Coliform In any One Sample. For B.Uses # 8	Discharge (cfs)	Air Temp. (deg C)	Water Temp. (deg F)	Water Temp. (deg C)	Field conductivity (µS/cm)	Lab conductivity (µS/cm)
9/1/1999	1000/100mL	2000	174	12	57.2	14	316	336
10/6/1999	1000/100mL	2000	37.5	8.5	46.6	8.1	343	377
10/27/1999	1000/100mL	2000	28	17	45.5	7.5	332	388
11/17/1999	1000/100mL	2000	27	3.5	39.2	4	376	400
12/14/1999	1000/100mL	2000	77	4.5	36.5	2.5	359	383
1/5/2000	1000/100mL	2000	68	1.5	33.4	0.8	357	365
2/1/2000	1000/100mL	2000	46	5	32.5	0.3	384	372
2/29/2000	1000/100mL	2000	62	1	37.4	3	378	381
3/28/2000	1000/100mL	2000	62	2	41.0	5	392	394
4/21/2000	1000/100mL	2000	78	18	51.4	10.79	351	366
4/25/2000	1000/100mL	2000	136	17	49.8	9.9	352	345
5/9/2000	1000/100mL	2000	132.6	14	49.3	9.6	366	382
6/28/2000	1000/100mL	2000	90	27	56.1	13.4	380	337
8/3/2000	1000/100mL	2000	66.5	16.79	57.4	14.13	375	369
8/11/2000	1000/100mL	2000	53	24	69.1	20.6	362	320
8/31/2000	1000/100mL	2000	52	27	59.9	15.52	362	303
11/1/2000	1000/100mL	2000	29	9	45.0	7.21	346	340

Table 1. Analysis Data for Lower Rapid Creek Above Canyon Lake.

Date	Dissolved Oxygen (mg/L)	Field pH	Lab alkalinity (mg/L)	Unionized Ammonia Load (Lb/day)	Unionized Ammonia Calculated (mg/L)	NH_4 as N (mg/L)	NH_4 as N LOAD (Lb/day)	NO_2 and NO_3 as N (mg/L)	NO_2 and NO_3 as N (mg/L) LOAD (Lb/day)
9/1/1999	9.54	8.19	134	1.813748	0.001934	0.05	46.9	0.13	121.9
10/6/1999	9.6	8.11	146	0.198499	0.000982	0.05	10.1	0.19	41.0
10/27/1999	9.8	8.24	156	0.178569	0.001183	0.05	7.5	0.13	19.6
11/17/1999	12.3	8.18	154	0.130543	0.000897	0.05	7.3	0.13	18.9
12/14/1999	11.8	8.26	154	0.413449	0.000996	0.05	20.8	0.08	33.2
1/5/2000	12	8.17	150	0.257552	0.000703	0.05	18.3	0.08	29.3
2/1/2000	14.8	7.84	158	0.639824	0.002580	0.05	12.4	0.08	19.8
2/29/2000	11.6	8.21	158	0.276512	0.000827	0.05	16.7	2.55	852.3
3/28/2000	11.3	8.15	164	0.324729	0.000972	0.05	16.71	0.09	30.1
4/21/2000	9.25	8.32	156	0.812450	0.001932	0.05	21.03	0.07	29.4
4/25/2000	9.11	7.5	144	0.214729	0.000293	0.05	36.66	0.09	66.0
5/9/2000	9.4	8.4	160	1.598003	0.002235	0.05	35.74	0.06	42.9
6/28/2000	8.27	8.23	154	0.903922	0.001863	0.05	24.26	0.07	33.96
8/3/2000	8.85	8.02	154	0.443706	0.001238	0.05	17.93	0.025	8.96
8/11/2000	7.47	8.19	148	0.876074	0.003066	0.05	14.29	0.025	7.14
8/31/2000	9.19	8.26	150	0.682536	0.002435	0.05	14.02	0.025	7.01
11/1/2000	10.49	8.5	148	0.179821	0.001150	0.05	7.82	0.025	3.91

Table 1. Analysis Data for Lower Rapid Creek Above Canyon Lake.

Date	Orthophosphate as P (mg/L)	Orthophosphate as P LOAD (Lb/day)	Total phophorus (mg/L)	Total phophorus LOAD (Lb/day)	TDS (mg/L)	TDS LOAD (Lb/day)	TSS (mg/L)	TSS LOAD (Lb/day)	Total Solids (mg/L)
9/1/1999	0.03	28.1	0.04	37.5	182	170725	7	6566	192
10/6/1999	0.04	8.1	0.04	8.1	190	38411	2.25	455	208
10/27/1999	0.01	1.5	0.04	6.0	194	29284	5	755	208
11/17/1999	0.01	1.5	0.01	1.5	220	32023	2.25	328	228
12/14/1999	0.005	2.1	0.02	8.3	196	81362	2.25	934	230
1/5/2000	0.005	1.8	0.005	1.8	200	73319	2.25	825	218
2/1/2000	0.01	2.5	0.02	5.0	178	44142	2.25	558	260
2/29/2000	0.005	1.7	0.005	1.7	214	71529	6	2005	230
3/28/2000	0.005	1.7	0.005	1.7	204	68186	2.25	752	244
4/21/2000	0.005	2.1	0.05	21.0	210	88306	2.25	946	232
4/25/2000	0.02	14.7	0.03	22.0	192	140772	19	13931	208
5/9/2000	0.02	14.3	0.02	14.3	198	141542	5	3574	230
6/28/2000	0.005	2.4	0.005	2.4	190	92187	2.25	1092	224
8/3/2000	0.03	10.8	0.03	10.8	214	76720	2.25	807	240
8/11/2000	0.005	1.4	0.005	1.4	190	54288	2.25	643	250
8/31/2000	0.005	1.4	0.01	2.8	202	56628	2.25	631	242
11/1/2000	0.02	3.1	0.02	3.1	170	26578	2.25	352	200

Table 1. Analysis Data for Lower Rapid Creek Above Canyon Lake.

Date	Total Solids LOAD (Lb/day)	TKN (mg/L)	Fecal Coliform (CFU/100ml)	Notes
9/1/1999	180105	0.25	22	
10/6/1999	42050	0.25	200	
10/27/1999	31398	0.25	4	
11/17/1999	33187	0.25	16	
12/14/1999	95476	0.25	2	
1/5/2000	79917	0.25	1	
2/1/2000	64477	0.25	6	
2/29/2000	76877	0.25	20	
3/28/2000	81556	0.25	4	
4/21/2000	97557	0.25	1	EVENT SNOW MELT SAMPLING
4/25/2000	152503	0.25	1	EVENT SNOW MELT SAMPLING
5/9/2000	164417	0.25	32	
6/28/2000	108684	0.25	12	
8/3/2000	86042	0.25	82	
8/11/2000	71432	0.25	102	EVENT RAIN
8/31/2000	67841	0.25	220	
11/1/2000	31268	0.25	46	EVENT RAIN

Table 1. Analysis Data for Lower Rapid Creek Above Canyon Lake.

Location	Station	Date	WQS TDS (mg/L) For B.Uses #1 30 Day Av.	WQS TDS (mg/L) For B.Uses #1 Daily Max.	WQS Total Coliform For B.Uses #1(mg/L) Geo. Mean	WQS Total ColiformFor B.Uses #1 (mg/L) in any Sample	WQS Nitrate as N For B.Uses#1 (mg/l)
Rapid Creek below Park Drive	06413200	9/1/1999	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	10/6/1999	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	10/27/1999	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	11/17/1999	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	12/14/1999	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	1/5/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	2/1/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	2/29/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	3/28/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	4/21/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	4/25/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	5/9/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	6/28/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	8/3/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	8/11/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413200	8/31/2000	1000	1750	5000/100mL	20000/100mL	10
Rapid Creek below Park Drive	06413201	11/1/2001	1000	1750	5000/100mL	20000/100mL	10

Table 2. Analysis Data for Lower Rapid Creek Below Park Drive.

Date	WQS Nitrate Load as N For B.Uses#1 (Lb/day)	WQS pH For B.Uses #1	WQS pH For B.Uses #1	WQS TDS LOAD (Lb/day) For B.Uses #1 30 Day Av.	WQS TDS LOAD (Lb/day) For B.Uses #1 Day Max..	WQS Un-ionized ammonia as N, For B.Uses #2 30 Day Av. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B. Uses #2 30 Day Av. (Lb/day)
9/1/1999	9542	6.5	6.5 - 9.0	954221	1669887	0.02	19
10/6/1999	3057	6.5	6.5 - 9.0	305674	534930	0.02	6
10/27/1999	1887	6.5	6.5 - 9.0	188688	330204	0.02	4
11/17/1999	2049	6.5	6.5 - 9.0	204861	358507	0.02	4
12/14/1999	5715	6.5	6.5 - 9.0	571454	1000045	0.02	11
1/5/2000	4906	6.5	6.5 - 9.0	490588	858529	0.02	10
2/1/2000	3342	6.5	6.5 - 9.0	334247	584932	0.02	7
2/29/2000	4313	6.5	6.5 - 9.0	431286	754751	0.02	9
3/28/2000	4313	6.5	6.5 - 9.0	431286	754751	0.02	9
4/21/2000	5822	6.5	6.5 - 9.0	582237	1018914	0.02	12
4/25/2000	4151	6.5	6.5 - 9.0	415113	726448	0.02	8
5/9/2000	7763	6.5	6.5 - 9.0	776315	1358552	0.02	16
6/28/2000	5607	6.5	6.5 - 9.0	560672	981176	0.02	11
8/3/2000	4421	6.5	6.5 - 9.0	442069	773620	0.02	9
8/11/2000	2469	6.5	6.5 - 9.0	246911	432095	0.02	5
8/31/2000	2264	6.5	6.5 - 9.0	226425	396244	0.02	5
11/1/2001	1456	6.5	6.5 - 9.0	145559	254729	0.02	3

Table 2. Analysis Data for Lower Rapid Creek Below Park Drive.

Date	WQS Un-ionized ammonia as N, For B.Uses #2 Daily Max. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #2 Daily Max. (Lb/day)	WQS Dissolved Oxygen For B.Uses#2 (mg/L)	WQS pH For B.Uses #2	WQS pH For B.Uses #2	WQS TDS (mg/L) 30 Day Av. For B.Uses #2	WQS TDS, LOAD (Lb/day) 30 Day Av. For B.Uses #2
9/1/1999	0.03632	35	6.0	6.6	6.6 - 8.6	30	28627
10/6/1999	0.03668	11	7.0	6.6	6.6 - 8.6	30	9170
10/27/1999	0.03614	7	7.0	6.6	6.6 - 8.6	30	5661
11/17/1999	0.03623	7	7.0	6.6	6.6 - 8.6	30	6146
12/14/1999	0.03603	21	6.0	6.6	6.6 - 8.6	30	17144
1/5/2000	0.03615	18	6.0	6.6	6.6 - 8.6	30	14718
2/1/2000	0.03608	12	6.0	6.6	6.6 - 8.6	30	10027
2/29/2000	0.03607	16	6.0	6.6	6.6 - 8.6	30	12939
3/28/2000	0.03602	16	6.0	6.6	6.6 - 8.6	30	12939
4/21/2000	0.03598	21	6.0	6.6	6.6 - 8.6	30	17467
4/25/2000	0.03615	15	6.0	6.6	6.6 - 8.6	30	12453
5/9/2000	0.03599	28	6.0	6.6	6.6 - 8.6	30	23289
6/28/2000	0.03576	20	6.0	6.6	6.6 - 8.6	30	16820
8/3/2000	0.03581	16	6.0	6.6	6.6 - 8.6	30	13262
8/11/2000	0.08568	21	6.0	6.6	6.6 - 8.6	30	7407
8/31/2000	0.03563	8	6.0	6.6	6.6 - 8.6	30	6793
11/1/2001	0.03989	6	6.0	6.6	6.6 - 8.6	30	4367

Table 2. Analysis Data for Lower Rapid Creek Below Park Drive.

Date	WQS TSS (mg/L) Daily Max. For B.Uses #2	WQS TSS, LOAD (Lb/day) Daily Max. For B.Uses #2	WQS Water Temp. In F, For B.Uses #2	WQS Water Temp. In C, For B.Uses #2	WQS Dissolved Oxygen (mg/L) For B.Uses #7	WQS Fecal Coliform (from May - Sept. 30) Geo.Mean For B.Uses #7	WQS Fecal Coliform In any One Sample. For B.Uses # 7and #8
9/1/1999	53	50574	65	18.41	5.0	200/100mL	400
10/6/1999	53	16201	65	18.41	5.0	200/100mL	400
10/27/1999	53	10000	65	18.41	5.0	200/100mL	400
11/17/1999	53	10858	65	18.41	5.0	200/100mL	400
12/14/1999	53	30287	65	18.41	5.0	200/100mL	400
1/5/2000	53	26001	65	18.41	5.0	200/100mL	400
2/1/2000	53	17715	65	18.41	5.0	200/100mL	400
2/29/2000	53	22858	65	18.41	5.0	200/100mL	400
3/28/2000	53	22858	65	18.41	5.0	200/100mL	400
4/21/2000	53	30859	65	18.41	5.0	200/100mL	400
4/25/2000	53	22001	65	18.41	5.0	200/100mL	400
5/9/2000	53	41145	65	18.41	5.0	200/100mL	400
6/28/2000	53	29716	65	18.41	5.0	200/100mL	400
8/3/2000	53	23430	65	18.41	5.0	200/100mL	400
8/11/2000	53	13086	65	18.41	5.0	200/100mL	400
8/31/2000	53	12001	65	18.41	5.0	200/100mL	400
11/1/2001	53	7715	65	18.41	5.0	200/100mL	400

Table 2. Analysis Data for Lower Rapid Creek Below Park Drive.

Date	WQS Dissolved Oxygen (mg/L) For B.Uses # 8	WQS Fecal Coliform (from May - Sept. 30) Geo.Mean For B.Uses # 8	WQS Fecal Coliform In any One Sample. For B.Uses # 8	Discharge (cfs)	Air Temp. (deg C)	Water Temp. (deg F)	Water Temp. (deg C)	Field conductivity (µS/cm)	Lab conductivity (µS/cm)
9/1/1999	5.00	1000/100mL	2000	177	29	61.7	16.5	318	352
10/6/1999	5.00	1000/100mL	2000	56.7	23	51.3	10.7	344	380
10/27/1999	5.00	1000/100mL	2000	35	15.5	49.3	9.6	336	389
11/17/1999	5.00	1000/100mL	2000	38	14	44.8	7.1	371	400
12/14/1999	5.00	1000/100mL	2000	106	4.5	37.8	3.2	364	383
1/5/2000	5.00	1000/100mL	2000	91	4.5	36.5	2.5	368	381
2/1/2000	5.00	1000/100mL	2000	62	6	35.6	2	375	361
2/29/2000	5.00	1000/100mL	2000	80	7.5	42.1	5.6	369	383
3/28/2000	5.00	1000/100mL	2000	80	10	45.5	7.5	381	382
4/21/2000	5.00	1000/100mL	2000	108	19	44.4	6.9	338	361
4/25/2000	5.00	1000/100mL	2000	77	22	48.2	9	337	355
5/9/2000	5.00	1000/100mL	2000	144	14	49.3	9.6	366	377
6/28/2000	5.00	1000/100mL	2000	104	27	53.2	11.76	377	348
8/3/2000	5.00	1000/100mL	2000	82	25	63.3	17.38	391	360
8/11/2000	5.00	1000/100mL	2000	45.8	26	68.4	20.23	362	403
8/31/2000	5.00	1000/100mL	2000	42	25	61.4	16.32	365	304
11/1/2001	5.00	1000/100mL	2000	27	9	48.3	9.04	367	365

Table 2. Analysis Data for Lower Rapid Creek Below Park Drive.

Date	Dissolved Oxygen (mg/L)	Field pH	Lab alkalinity (mg/L)	Unionized Ammonia LOAD (Lb/day)	Unionized Ammonia Calculated (mg/L)	NH_4 as N (mg/L)	NH_4 as N LOAD (Lb/day)	NO_2 and NO_3 as N (mg/L)	NO2 and NO3 as N LOAD (Lb/day)
9/1/1999	9.54	8.28	138	2.750237	0.002882	0.05	47.7	0.11	105.0
10/6/1999	10.3	8.50	152	0.915331	0.002994	0.05	15.3	0.21	64.2
10/27/1999	10.2	8.15	160	0.270601	0.001434	0.05	9.4	0.16	30.2
11/17/1999	10.2	8.08	160	0.186002	0.000908	0.05	10.2	0.19	38.9
12/14/1999	12	8.03	156	0.300135	0.000525	0.05	28.6	0.14	80.0
1/5/2000	12	8.21	158	0.389723	0.000794	0.05	24.5	0.14	68.7
2/1/2000	12.2	7.99	164	0.161752	0.000484	0.05	16.7	0.14	46.8
2/29/2000	11.2	8.17	158	0.453580	0.001052	0.05	21.6	0.12	51.8
3/28/2000	10.2	8.18	160	0.510197	0.001183	0.05	21.6	0.12	51.8
4/21/2000	10.18	8.01	148	0.421487	0.000724	0.05	29.1	0.025	14.6
4/25/2000	9.72	8.00	146	0.351412	0.000847	0.05	20.8	0.14	58.1
5/9/2000	9.4	8.40	160	1.735388	0.002235	0.05	38.8	0.08	62.1
6/28/2000	9.33	9.97	154	19.097324	0.034061	0.05	28.0	0.09	50.5
8/3/2000	8.01	8.00	152	0.695753	0.001574	0.05	22.1	0.06	26.5
8/11/2000	7.63	7.98	148	1.140478	0.004619	0.05	12.3	0.12	29.6
8/31/2000	8.96	8.01	154	0.329243	0.001454	0.05	11.3	0.06	13.6
11/1/2001	9.47	8.24	158	0.212674	0.001461	0.05	7.3	0.12	17.5

Table 2. Analysis Data for Lower Rapid Creek Below Park Drive.

Date	Orthophosphate as P (mg/L)	Orthophosphate as P LOAD (Lb/day)	Total phophorus (mg/L)	Total phophorus LOAD (Lb/day)	TDS (mg/L)	TDS LOAD (Lb/day)	TSS (mg/L)	TSS LOAD (Lb/day)
9/1/1999	0.04	38.2	0.03	28.6	186	177485	2.25	2147
10/6/1999	0.04	38.2	0.03	9.2	196	59912	2.25	688
10/27/1999	0.01	12.2	0.03	5.7	130	24529	2.25	425
11/17/1999	0.02	1.9	0.01	2.0	200	40972	2.25	461
12/14/1999	0.005	4.1	0.07	40.0	198	113148	2.25	1286
1/5/2000	0.005	2.9	0.005	2.5	216	105967	2.25	1104
2/1/2000	0.02	2.5	0.02	6.7	180	60164	2.25	752
2/29/2000	0.005	6.7	0.005	2.2	208	89708	2.25	970
3/28/2000	0.005	2.2	0.005	2.2	196	84532	2.25	970
4/21/2000	0.005	2.2	0.005	2.9	184	107132	2.25	1310
4/25/2000	0.03	2.9	0.04	16.6	194	80532	7	2906
5/9/2000	0.03	12.5	0.03	23.3	190	147500	9	6987
6/28/2000	0.02	23.3	0.02	11.2	180	100921	2.25	1262
8/3/2000	0.02	11.2	0.02	8.8	202	89298	5	2210
8/11/2000	0.08	8.8	0.08	19.8	190	46913	64	15802
8/31/2000	0.02	19.8	0.03	6.8	206	46644	8	1811
11/1/2001	0.02	4.5	0.03	4.4	210	30567	2.25	328

Table 2. Analysis Data for Lower Rapid Creek Below Park Drive.

Date	Total Solids (mg/L)	Total Solids LOAD (Lb/day)	TKN (mg/L)	Fecal Coliform (CFU/100ml)	Notes
9/1/1999	188	179394	0.25	36	
10/6/1999	216	66026	0.25	8	
10/27/1999	200	37738	0.6	2	
11/17/1999	230	47118	0.25	2	
12/14/1999	230	131435	2.1	6	
1/5/2000	230	112835	0.25	20	
2/1/2000	254	84899	0.25	20	
2/29/2000	212	91433	0.25	78	
3/28/2000	244	105234	0.25	2	
4/21/2000	218	126928	0.25	1	
4/25/2000	208	86344	0.25	1	EVENT SNOW MELT SAMPLING
5/9/2000	222	172342	0.25	14	EVENT SNOW MELT SAMPLING
6/28/2000	230	128955	0.25	12	
8/3/2000	230	101676	0.25	44	
8/11/2000	312	77036	0.6	220	EVENT RAIN
8/31/2000	252	57059	0.25	30	
11/1/2001	230	33479	0.25	74	EVENT RAIN

Table 2. Analysis Data for Lower Rapid Creek Below Park Drive.

Location	Station	Date	WQS TDS (mg/L) For B.Uses #1 30 Day Av.	WQS TDS (mg/L) For B.Uses #1 Daily Max.	WQS Nitrates as N For B.Uses #1 (mg/L)	WQS Nitrates as N Load For B.Uses #1 (Lb/day)	WQS Total Coliform For B.Uses #1 (mg/L) Geo. Mean
Rapid Creek below Hawthorn Ditch	06416000	9/1/1999	1000	1750	10	9434	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	10/6/1999	1000	1750	10	3127	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	10/27/1999	1000	1750	10	3019	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	11/17/1999	1000	1750	10	2965	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	12/14/1999	1000	1750	10	5607	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	1/5/2000	1000	1750	10	4879	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	2/1/2000	1000	1750	10	2696	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	2/29/2000	1000	1750	10	4879	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	3/28/2000	1000	1750	10	4879	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	4/21/2000	1000	1750	10	13046	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	4/25/2000	1000	1750	10	10351	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	5/9/2000	1000	1750	10	8572	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	6/28/2000	1000	1750	10	5930	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	8/3/2000	1000	1750	10	4151	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	8/11/2000	1000	1750	10	16173	5000/100mL
Rapid Creek below Hawthorn Ditch	06416000	8/31/2000	1000	1750	10	3235	5000/100mL
Rapid Creek below Hawthorn Ditch	06416001	11/1/2000	1001	1750	10	8949	5000/100mL

Table 3. Analysis Data for Lower Rapid Creek Below Hawthorn Ditch.

Date	WQS Total Coliform For B.Uses #1 (mg/L) in any Sample	WQS pH For B.Uses #1	WQS TDS LOAD (Lb/day) For B.Uses #1 30 Day Av.	WQS TDS LOAD (Lb/day) For B.Uses #1 Day Max..	WQS Un-ionized ammonia as N, For B.Uses #2 30 Day Av. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #2 30 Day Av. (Lb/day)	WQS Un-ionized ammonia as N, For B.Uses #2 Daily Max. (mg/L)
9/1/1999	20000/100mL	6.5 - 9.0	943439	1651018	0.02	19	0.0362
10/6/1999	20000/100mL	6.5 - 9.0	312683	547195	0.02	6	0.0363
10/27/1999	20000/100mL	6.5 - 9.0	301900	528326	0.02	6	0.0360
11/17/1999	20000/100mL	6.5 - 9.0	296509	518891	0.02	6	0.0362
12/14/1999	20000/100mL	6.5 - 9.0	560672	981176	0.02	11	0.0362
1/5/2000	20000/100mL	6.5 - 9.0	487893	853812	0.02	10	0.0360
2/1/2000	20000/100mL	6.5 - 9.0	269554	471719	0.02	5	0.0333
2/29/2000	20000/100mL	6.5 - 9.0	487893	853812	0.02	10	0.0360
3/28/2000	20000/100mL	6.5 - 9.0	487893	853812	0.02	10	0.0362
4/21/2000	20000/100mL	6.5 - 9.0	1304641	2283122	0.02	26	0.0361
4/25/2000	20000/100mL	6.5 - 9.0	1035087	1811403	0.02	21	0.0363
5/9/2000	20000/100mL	6.5 - 9.0	857182	1500068	0.02	17	0.0291
6/28/2000	20000/100mL	6.5 - 9.0	593019	1037783	0.02	12	0.0355
8/3/2000	20000/100mL	6.5 - 9.0	415113	726448	0.02	8	0.0361
8/11/2000	20000/100mL	6.5 - 9.0	1617324	2830317	0.02	32	0.0404
8/31/2000	20000/100mL	6.5 - 9.0	323465	566063	0.02	6	0.0362
11/1/2000	20000/100mL	6.5 - 9.0	895814	1566109	0.02	18	0.0356

Table 3. Analysis Data for Lower Rapid Creek Below Hawthorn Ditch.

Date	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #2 Daily Max. (Lb/day)	WQS Dissolved Oxygen For B.Uses#2 (mg/L)	WQS Dissolved Oxygen For B.Uses#2 (mg/L)	WQS pH For B.Uses #2	WQS pH For B.Uses #2	WQS TDS (mg/L) 30 Day Av. For B.Uses #2	WQS TDS, LOAD (Lb/day) 30 Day Av. For B.Uses #2	WQS TSS (mg/L) Daily Max. For B.Uses #2
9/1/1999	34	6.0	6.0	6.6	6.6 - 8.6	30	28303	53
10/6/1999	11	6.0	7.0	6.6	6.6 - 8.6	30	9380	53
10/27/1999	11	6.0	7.0	6.6	6.6 - 8.6	30	9057	53
11/17/1999	11	6.0	7.0	6.6	6.6 - 8.6	30	8895	53
12/14/1999	20	6.0	6.0	6.6	6.6 - 8.6	30	16820	53
1/5/2000	18	6.0	6.0	6.6	6.6 - 8.6	30	14637	53
2/1/2000	9	6.0	6.0	6.6	6.6 - 8.6	30	8087	53
2/29/2000	18	6.0	6.0	6.6	6.6 - 8.6	30	14637	53
3/28/2000	18	6.0	6.0	6.6	6.6 - 8.6	30	14637	53
4/21/2000	47	6.0	6.0	6.6	6.6 - 8.6	30	39139	53
4/25/2000	38	6.0	6.0	6.6	6.6 - 8.6	30	31053	53
5/9/2000	25	6.0	6.0	6.6	6.6 - 8.6	30	25715	53
6/28/2000	21	6.0	6.0	6.6	6.6 - 8.6	30	17791	53
8/3/2000	15	6.0	6.0	6.6	6.6 - 8.6	30	12453	53
8/11/2000	65	6.0	6.0	6.6	6.6 - 8.6	30	48520	53
8/31/2000	12	6.0	6.0	6.6	6.6 - 8.6	30	9704	53
11/1/2000	32	6.0	6.0	6.6	6.6 - 8.6	30	26848	53

Table 3. Analysis Data for Lower Rapid Creek Below Hawthorn Ditch.

Date	WQS TSS, LOAD (Lb/day) Daily Max. For B.Uses #2	WQS Water Temp, Deg F, For B.Uses #2	WQS Water Temp. In C, For B.Uses #2	WQS Dissolved Oxygen (mg/L) For B.Uses #7	WQS Fecal Coliform from (May - Sept. 30) Geo.Mean For B.Uses #7	WQS Fecal Coliform In any One Sample. For B.Uses #7and #8	WQS Dissolved Oxygen (mg/L) For B.Uses # 8
9/1/1999	50002	65	18.41	5.0	200/100mL	400	5.00
10/6/1999	16572	65	18.41	5.0	200/100mL	400	5.00
10/27/1999	16001	65	18.41	5.0	200/100mL	400	5.00
11/17/1999	15715	65	18.41	5.0	200/100mL	400	5.00
12/14/1999	29716	65	18.41	5.0	200/100mL	400	5.00
1/5/2000	25858	65	18.41	5.0	200/100mL	400	5.00
2/1/2000	14286	65	18.41	5.0	200/100mL	400	5.00
2/29/2000	25858	65	18.41	5.0	200/100mL	400	5.00
3/28/2000	25858	65	18.41	5.0	200/100mL	400	5.00
4/21/2000	69146	65	18.41	5.0	200/100mL	400	5.00
4/25/2000	54860	65	18.41	5.0	200/100mL	400	5.00
5/9/2000	45431	65	18.41	5.0	200/100mL	400	5.00
6/28/2000	31430	65	18.41	5.0	200/100mL	400	5.00
8/3/2000	22001	65	18.41	5.0	200/100mL	400	5.00
8/11/2000	85718	65	18.41	5.0	200/100mL	400	5.00
8/31/2000	17144	65	18.41	5.0	200/100mL	400	5.00
11/1/2000	47431	65	18.41	5.0	200/100mL	400	5.00

Table 3. Analysis Data for Lower Rapid Creek Below Hawthorn Ditch.

Date	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses # 8	WQS Fecal Coliform In any One Sample. For B.Uses # 8	Discharge (cfs)	Air Temp. (deg C)	Water Temp. (deg F)	Water Temp. (deg C)	Field conductivity (µS/cm)	Lab conductivity (µS/cm)	Dissolved Oxygen (mg/L)
9/1/1999	1000/100mL	2000	175	24.5	63.5	17.5	410	451	9.54
10/6/1999	1000/100mL	2000	58	18	50.2	10.1	626	662	11.2
10/27/1999	1000/100mL	2000	56	14	48.2	9	332	696	10.4
11/17/1999	1000/100mL	2000	55	17	44.4	6.9	669	706	11.5
12/14/1999	1000/100mL	2000	104	11.5	37.6	3.1	506	510	12.7
1/5/2000	1000/100mL	2000	90.5	3.1	36.9	2.7	529	525	12.7
2/1/2000	1000/100mL	2000	50	6	33.4	0.8	576	551	13.3
2/29/2000	1000/100mL	2000	90.5	10	41.5	5.3	512	529	12
3/28/2000	1000/100mL	2000	90.5	8	44.4	6.9	523	543	11.8
4/21/2000	1000/100mL	2000	242	18	47.6	8.64	497	521	8.18
4/25/2000	1000/100mL	2000	192	17	52.4	11.33	610	604	9.42
5/9/2000	1000/100mL	2000	159	18	51.0	10.53	518	512	10.34
6/28/2000	1000/100mL	2000	110	27	57.6	14.2	560	522	9
8/3/2000	1000/100mL	2000	77	26	46.9	8.26	545	537	8.37
8/11/2000	1000/100mL	2000	300	27	72.6	22.53	422	342	2.87
8/31/2000	1000/100mL	2000	60	25	62.0	16.69	526	443	8.25
11/1/2000	1000/100mL	2000	166	5	44.9	7.16	501	493	9.14

Table 3. Analysis Data for Lower Rapid Creek Below Hawthorn Ditch.

Date	Field pH	Lab alkalinity (mg/L)	Unionized Ammonia LOAD (Lb/day)	Unionized Ammonia Calculated (mg/L)	NH_4 as N (mg/L)	NH_4 as N LOAD (Lb/day)	NO_2 and NO_3 as N (mg/L)	NO_2 and NO_3 as N (mg/L) LOAD (Lb/day)	Orthophosphate as P (mg/L)
9/1/1999	8.44	150	3.614236	0.003831	0.05	47.2	0.21	198.1	0.02
10/6/1999	8.6	174	1.079568	0.003453	0.05	15.6	0.48	150.1	0.03
10/27/1999	8.26	182	0.501481	0.001661	0.05	15.1	0.43	129.8	0.02
11/17/1999	8.13	184	0.269214	0.000908	0.05	14.8	0.46	136.4	0.005
12/14/1999	8.19	168	0.463827	0.000827	0.05	28.0	0.31	173.8	0.01
1/5/2000	8.11	172	0.321721	0.000659	0.05	24.4	0.3	146.4	0.02
2/1/2000	8.29	178	0.237547	0.000881	0.05	13.5	0.31	83.6	0.02
2/29/2000	8.15	172	0.473999	0.000972	0.05	24.4	0.25	122.0	0.02
3/28/2000	8.18	170	0.555067	0.001138	0.05	24.4	0.22	107.3	0.005
4/21/2000	7.99	115	1.104438	0.000847	0.05	65.2	0.36	469.7	0.16
4/25/2000	8.03	154	1.061666	0.001026	0.05	51.8	0.4	414.0	0.05
5/9/2000	8.38	168	1.656149	0.001932	0.05	42.9	0.21	180.0	0.02
6/28/2000	8.03	170	0.742841	0.001253	0.05	29.7	0.26	154.2	0.04
8/3/2000	7.91	164	0.264650	0.000638	0.05	20.8	0.19	78.9	0.03
8/11/2000	7.85	120	10.526705	0.006509	0.2	323.5	0.53	857.2	0.46
8/31/2000	8.06	170	0.492574	0.001523	0.05	16.2	0.23	74.4	0.02
11/1/2000	7.81	112	0.413551	0.000462	0.05	44.7	0.38	340.1	0.17

Table 3. Analysis Data for Lower Rapid Creek Below Hawthorn Ditch.

Date	Orthophosphate as P LOAD (Lb/day)	Total phophorus (mg/L)	Total phophorus LOAD (Lb/day)	TDS (mg/L)	TDS LOAD (Lb/day)	TSS (mg/L)	TSS LOAD (Lb/day)	Total Solids (mg/L)	Total Solids LOAD (Lb/day)	TKN (mg/L)
9/1/1999	18.9	0.05	47.2	280	264163	7	6604	276	260389	0.25
10/6/1999	9.4	0.03	9.4	424	132577	2.25	704	460	143834	0.25
10/27/1999	6.0	0.03	9.1	416	125591	7	2113	460	138874	0.25
11/17/1999	1.5	0.005	1.5	440	130464	2.25	667	476	141138	0.25
12/14/1999	5.6	0.01	5.6	302	169323	2.25	1262	354	198478	6
1/5/2000	9.8	0.04	19.5	318	155150	2.25	1098	344	167835	0.25
2/1/2000	5.4	0.02	5.4	318	85718	2.25	606	412	111056	0.25
2/29/2000	9.8	0.02	9.8	324	158077	2.25	1098	330	161005	0.25
3/28/2000	2.4	0.005	2.4	320	156126	2.25	1098	358	174666	0.25
4/21/2000	208.7	0.22	287.0	306	399220	142	185259	486	634056	0.9
4/25/2000	51.8	0.05	51.8	376	389193	21	21737	420	434737	0.6
5/9/2000	17.1	0.02	17.1	360	308585	10	8572	348	298299	0.25
6/28/2000	23.7	0.05	29.7	344	203998	6	3558	372	220603	0.25
8/3/2000	12.5	0.05	20.8	342	141969	10	4151	404	167706	0.25
8/11/2000	744.0	0.63	1018.9	262	423739	576	931579	936	1513815	2.1
8/31/2000	6.5	0.04	12.9	350	113213	11	3558	388	125504	0.25
11/1/2000	152.1	0.19	170.0	260	232679	100	89492	450	402714	0.6

Table 3. Analysis Data for Lower Rapid Creek Below Hawthorn Ditch.

Date	Fecal Coliform (CFU/100ml)	Notes
9/1/1999	200	
10/6/1999	36	
10/27/1999	20	
11/17/1999	2	
12/14/1999	10	
1/5/2000	12	
2/1/2000	4	
2/29/2000	8	
3/28/2000	1	
4/21/2000	250	SNOW MELT EVENT SAMPLING
4/25/2000	34	SNOW MELT EVENT SAMPLING
5/9/2000	16	
6/28/2000	120	
8/3/2000	1600	
8/11/2000	510	EVENT RAIN
8/31/2000	290	
11/1/2000	6100	EVENT RAIN

Table 3. Analysis Data for Lower Rapid Creek Below Hawthorn Ditch.

Location	Station	Date	WQS Un-ionized ammonia as N, For B.Uses # 4 30 Day Av. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 30 Day Av. (Lb/day)	WQS Un-ionized ammonia as N, For B.Uses # 4 Daily Max. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 Daily Max. (Lb/day)
Rapid Creek above WWTP	440126103054701	9/1/1999	0.04	51	0.0717	85
Rapid Creek above WWTP	440126103054701	10/6/1999	0.04	15	0.0720	25
Rapid Creek above WWTP	440126103054701	10/27/1999	0.04	11	0.0722	18
Rapid Creek above WWTP	440126103054701	11/17/1999	0.04	11	0.0564	15
Rapid Creek above WWTP	440126103054701	12/14/1999	0.04	23	0.0720	38
Rapid Creek above WWTP	440126103054701	1/5/2000	0.04	26	0.0720	44
Rapid Creek above WWTP	440126103054701	2/1/2000	0.04	26	0.0702	42
Rapid Creek above WWTP	440126103054701	2/29/2000	0.04	23	0.0722	39
Rapid Creek above WWTP	440126103054701	3/28/2000	0.04	23	0.0719	39
Rapid Creek above WWTP	440126103054701	4/21/2000	0.04	66	0.0737	115
Rapid Creek above WWTP	440126103054701	4/25/2000	0.04	60	0.0721	102
Rapid Creek above WWTP	440126103054701	5/9/2000	0.04	37	0.0623	54
Rapid Creek above WWTP	440126103054701	6/28/2000	0.04	34	0.0723	58
Rapid Creek above WWTP	440126103054701	8/3/2000	0.04	14	0.0712	23
Rapid Creek above WWTP	440126103054701	8/12/2000	0.04	10	0.0712	17
Rapid Creek above WWTP	440126103054701	8/31/2000	0.04	8	0.0803	16
Rapid Creek above WWTP	440126103054701	11/1/2000	0.04	41	0.0717	70

Table 4. Analysis Data for Lower Rapid Creek Above WWTP.

Date	WQS Dissolved Oxygen For B.Uses# 4 (mg/L)	WQS pH For B.Uses # 4	WQS pH For B.Uses # 4	WQS Water Temp, Deg F, For B.Uses # 4	WQS Water Temp, Deg C, For B.Uses # 4	TSS (mg/L) For B.Uses # 4 30 Day AV.	TSS LOAD (Lb/day) For B.Uses # 4 30 Day Av.	TSS (mg/L) For B.Uses # 4 Daily Max. AV.	TSS LOAD (Lb/day) For B.Uses # 4 Daily Max.
9/1/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	107229	158	188246
10/6/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	31053	158	54515
10/27/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	22804	158	40034
11/17/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	23532	158	41312
12/14/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	48035	158	84327
1/5/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	54827	158	96252
2/1/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	54439	158	95571
2/29/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	49005	158	86031
3/28/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	48520	158	85179
4/21/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	140707	158	247019
4/25/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	127607	158	224021
5/9/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	78117	158	137138
6/28/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	72780	158	127769
8/3/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	29112	158	51107
8/12/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	21349	158	37479
8/31/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	17467	158	30664
11/1/2000	5.0	6.5	6.5 - 9.0	80	26.74	91	88306	158	153322

Table 4. Analysis Data for Lower Rapid Creek Above WWTP.

Date	WQS Dissolved Oxygen (mg/L) For B.Uses #4, #7 and #8	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses #7	WQS Fecal Coliform In any One Sample. For B.Uses #7 and #8	WQS Dissolved Oxygen (mg/L) For B.Uses # 8	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses # 8	WQS Fecal Coliform In any One Sample. For B.Uses # 8	Discharge (cfs)	Air Temp. (deg C)
9/1/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	221	24
10/6/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	64	18
10/27/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	47	12
11/17/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	48.5	22
12/14/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	99	3.2
1/5/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	113	11
2/1/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	112	2
2/29/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	101	14
3/28/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	100	11
4/21/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	290	14
4/25/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	263	18
5/9/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	161	19
6/28/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	150	30
8/3/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	60	29
8/12/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	44	26
8/31/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	36	25
11/1/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	180	9

Table 4. Analysis Data for Lower Rapid Creek Above WWTP.

Date	Water Temp. (deg F)	Water Temp. (deg C)	Field conductivity (µS/cm)	Lab conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Field pH	Lab alkalinity (mg/L)	Unionized Ammonia LOAD (Lb/day)	Unionized Ammonia Measured (mg/L)
9/1/1999	66.4	19.1	457	488	9.54	8.56	150	7.632252	0.006406
10/6/1999	51.3	10.7	721	758	11.2	8.22	184	0.533763	0.001547
10/27/1999	47.3	8.5	802	826	11.6	8.27	190	0.405093	0.001599
11/17/1999	43.2	6.2	772	807	12.4	8.08	188	0.174860	0.000669
12/14/1999	35.8	2.1	572	569	13.2	8.31	174	0.510420	0.000956
1/5/2000	33.6	0.9	584	575	13.2	8.23	162	0.427991	0.000703
2/1/2000	32.7	0.4	729	691	13.4	8.21	2	0.391200	0.000647
2/29/2000	41.9	5.5	616	621	12.4	8.22	172	0.550436	0.001011
3/28/2000	46.6	8.1	587	609	11.8	8.16	174	0.663016	0.001230
4/21/2000	44.1	6.71	778	808	10.34	7.9	140	1.803366	0.001153
4/25/2000	51.4	10.8	795	794	9.13	7.74	159	0.708620	0.000500
5/9/2000	52.0	11.1	678	604	10.63	8.39	174	1.816870	0.002093
6/28/2000	59.5	15.3	818	589	7.78	7.74	168	0.702262	0.000868
8/3/2000	69.4	20.76	654	640	7.08	7.7	166	0.330807	0.001023
8/12/2000	69.4	20.8	600	602	5.25	7.31	142	0.098148	0.000414
8/31/2000	62.9	17.19	655	558	8.4	7.85	176	0.239265	0.001233
11/1/2000	46.6	8.11	642	633	9.37	8.02	118	0.764754	0.000788

Table 4. Analysis Data for Lower Rapid Creek Above WWTP.

Date	NH_4 as N (mg/L)	NH_4 as N LOAD (Lb/day)	NO_2 and NO_3 as N (mg/L)	NO_2 and NO_3 as N (mg/L) LOAD (Lb/day)	Orthophosphate as P (mg/L)	Orthophosphate as P LOAD (Lb/day)	Total phophorus (mg/L)	Total phophorus LOAD (Lb/day)
9/1/1999	0.05	59.6	0.17	202.5	0.05	59.6	0.05	59.6
10/6/1999	0.05	17.3	0.44	151.8	0.03	10.4	0.03	10.4
10/27/1999	0.05	12.7	0.35	88.7	0.02	5.1	0.4	101.4
11/17/1999	0.05	13.1	0.37	96.7	0.005	1.3	0.005	1.3
12/14/1999	0.05	26.7	0.33	176.1	0.01	5.3	0.01	5.3
1/5/2000	0.05	30.5	0.3	182.8	0.005	3.0	0.01	6.1
2/1/2000	0.05	30.2	0.33	199.6	0.02	12.1	0.03	18.1
2/29/2000	0.05	27.2	0.23	125.2	0.02	10.9	0.03	16.3
3/28/2000	0.05	27.0	0.13	70.1	0.005	2.7	0.02	10.8
4/21/2000	0.1	156.3	0.51	797.3	0.16	250.1	0.22	344.0
4/25/2000	0.05	70.9	0.44	623.9	0.11	156.0	0.12	170.1
5/9/2000	0.05	43.4	0.17	147.6	0.02	17.4	0.02	17.4
6/28/2000	0.05	40.4	0.25	202.2	0.03	24.3	0.05	40.4
8/3/2000	0.05	16.2	0.16	51.8	0.08	25.9	0.1	32.3
8/12/2000	0.05	11.9	0.31	73.5	0.06	14.2	0.1	23.7
8/31/2000	0.05	9.7	0.12	23.3	0.03	5.8	0.05	9.7
11/1/2000	0.05	48.5	0.4	388.2	0.25	242.6	0.31	300.8

Table 4. Analysis Data for Lower Rapid Creek Above WWTP.

Date	TDS (mg/L)	TDS LOAD (Lb/day)	TSS (mg/L)	TSS LOAD (Lb/day)	Total Solids (mg/L)	Total Solids LOAD (Lb/day)	TKN (mg/L)	Fecal Coliform (CFU/100ml)
9/1/1999	304	362194	22	26211	336	400320	0.25	210
10/6/1999	492	169754	2.25	776	542	187006	0.25	16
10/27/1999	420	106420	2.25	570	536	135812	0.25	12
11/17/1999	518	135440	2.25	588	588	153743	0.5	2
12/14/1999	352	187868	2.25	1201	406	216689	0.25	1
1/5/2000	370	225401	15	9138	388	236366	0.25	1
2/1/2000	406	245581	15	9073	512	309698	0.25	4
2/29/2000	396	215622	14	7623	408	222156	0.25	1
3/28/2000	358	193001	14	7548	418	225347	0.25	2
4/21/2000	532	831736	42	65663	592	925541	0.9	1200
4/25/2000	530	751463	74	104921	656	930112	0.6	1100
5/9/2000	362	314203	16	13887	412	357601	0.25	20
6/28/2000	378	305674	24	19408	442	357429	0.25	350
8/3/2000	422	136502	66	21349	562	181787	0.6	2600
8/12/2000	378	89664	53	12572	540	128092	0.9	490000
8/31/2000	454	88112	38	7375	520	100921	0.25	280
11/1/2000	400	388158	350	339638	780	756908	1.5	4500

Table 4. Analysis Data for Lower Rapid Creek Above WWTP.

Date	Notes
9/1/1999	
10/6/1999	
10/27/1999	
11/17/1999	
12/14/1999	
1/5/2000	
2/1/2000	
2/29/2000	
3/28/2000	
4/21/2000	**EVENT SNOW MELT SAMPLING**
4/25/2000	**EVENT SNOW MELT SAMPLING**
5/9/2000	
6/28/2000	
8/3/2000	
8/12/2000	**EVENT RAIN**
8/31/2000	
11/1/2000	**EVENT RAIN**

Table 4. Analysis Data for Lower Rapid Creek Above WWTP.

Location	Station	Date	WQS Un-ionized ammonia as N, For B.Uses # 4 30 Day Av. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 30 Day Av. (Lb/day)	WQS Un-ionized ammonia as N, For B.Uses # 4 Daily Max. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 Daily Max. (Lb/day)
Rapid Creek below WWTP	06418900	9/1/1999	0.04	44	0.0689	75
Rapid Creek below WWTP	06418900	10/6/1999	0.04	17	0.0729	32
Rapid Creek below WWTP	06418900	10/27/1999	0.04	14	0.0734	27
Rapid Creek below WWTP	06418900	11/17/1999	0.04	14	0.0757	26
Rapid Creek below WWTP	06418900	12/14/1999	0.04	27	0.0720	48
Rapid Creek below WWTP	06418900	1/5/2000	0.04	26	0.0787	50
Rapid Creek below WWTP	06418900	2/1/2000	0.04	28	0.0706	49
Rapid Creek below WWTP	06418900	2/29/2000	0.04	26	0.0750	49
Rapid Creek below WWTP	06418900	3/28/2000	0.04	25	0.0743	47
Rapid Creek below WWTP	06418900	4/25/2000	0.04	63	0.0731	114
Rapid Creek below WWTP	06418900	5/9/2000	0.04	39	0.0723	71
Rapid Creek below WWTP	06418900	6/28/2000	0.04	37	0.0753	69
Rapid Creek below WWTP	06418900	8/3/2000	0.04	17	0.0770	34
Rapid Creek below WWTP	06418900	8/12/2000	0.04	14	0.0720	25
Rapid Creek below WWTP	06418900	8/31/2000	0.04	12	0.0786	23
Rapid Creek below WWTP	06418901	11/1/2000	0.04	43	0.0720	78

Table 5. Analysis Data for Lower Rapid Creek Below WWTP.

Date	WQS Dissolved Oxygen For B.Uses# 4 (mg/L)	WQS pH For B.Uses # 4	WQS pH For B.Uses # 4	WQS Water Temp, Deg F, For B.Uses # 4	WQS Water Temp, Deg C, For B.Uses # 4	TSS (mg/L) For B.Uses # 4 30 Day AV.	TSS LOAD (Lb/day) For B.Uses # 4 30 Day Av.	TSS (mg/L) For B.Uses # 4 Daily Max. AV.	TSS LOAD (Lb/day) For B.Uses # 4 Daily Max..
9/1/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	98010	158	172062
10/6/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	39301	158	68995
10/27/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	32508	158	57070
11/17/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	31295	158	54940
12/14/1999	5.0	6.5	6.5 - 9.0	80	26.74	90	60164	158	105622
1/5/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	57738	158	101363
2/1/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	62105	158	109029
2/29/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	58224	158	102215
3/28/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	57253	158	100511
4/25/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	140707	158	247019
5/9/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	87821	158	154174
6/28/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	82969	158	145656
8/3/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	39301	158	68995
8/12/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	30761	158	54004
8/31/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	26201	158	45997
11/1/2000	5.0	6.5	6.5 - 9.0	80	26.74	90	97039	158	170358

Table 5. Analysis Data for Lower Rapid Creek Below WWTP.

Date	WQS Dissolved Oxygen (mg/L) For B.Uses #4, #7 and #8	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses #7	WQS Fecal Coliform In any One Sample. For B.Uses #7 and #8	WQS Dissolved Oxygen (mg/L) For B.Uses # 8	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses # 8	WQS Fecal Coliform In any One Sample. For B.Uses # 8	Discharge (cfs)	Air Temp. (deg C)
9/1/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	202	31
10/6/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	81	26
10/27/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	67	14
11/17/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	64.5	22
12/14/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	124	2.6
1/5/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	119	5.5
2/1/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	128	-0.5
2/29/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	120	10.5
3/28/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	118	16
4/25/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	290	17
5/9/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	181	20
6/28/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	171	30
8/3/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	81	28
8/12/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	63.4	27
8/31/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	54	28
11/1/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	200	8

Table 5. Analysis Data for Lower Rapid Creek Below WWTP.

Date	Water Temp. (deg F)	Water Temp. (deg C)	Field conductivity (µS/cm)	Lab conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Field pH	Lab alkalinity (mg/L)	Unionized Ammonia LOAD (Lb/day)	Unionized Ammonia Measured (mg/L)
9/1/1999	66.7	19.3	603	645	9.54	8.35	156	20.6222	0.018937
10/6/1999	55.4	13	896	947	9.8	8.26	180	1.7004	0.003894
10/27/1999	51.8	11	1015	1050	10.8	8.14	212	1.7055	0.004722
11/17/1999	48.2	9	921	970	11.3	8.16	190	0.4203	0.001209
12/14/1999	37.8	3.2	703	680	12.4	8.24	176	1.2786	0.001913
1/5/2000	36.9	2.7	711	700	12.4	8.26	174	1.4211	0.002215
2/1/2000	34.9	1.6	829	789	12.6	8.04	182	0.6451	0.000935
2/29/2000	44.6	7	741	740	12.2	8.12	176	3.9239	0.006065
3/28/2000	49.3	9.6	722	740	11.2	8.37	174	2.8441	0.004471
4/25/2000	51.5	10.84	991	990	8.33	7.6	154	2.4878	0.001591
5/9/2000	53.4	11.87	755	728	9.93	8.29	178	1.9570	0.002006
6/28/2000	59.5	15.3	818	738	7.78	7.74	176	0.7399	0.000803
8/3/2000	70.0	21.12	885	857	6.67	7.52	170	1.8773	0.004299
8/12/2000	69.8	20.99	810	803	5.96	7.3	158	1.1556	0.003381
8/31/2000	65.6	18.69	920	872	7.75	7.62	176	0.4507	0.001548
11/1/2000	48.2	8.99	670	651	8.63	7.98	118	3.6510	0.003386

Table 5. Analysis Data for Lower Rapid Creek Below WWTP.

Date	NH_4 as N (mg/L)	NH_4 as N LOAD (Lb/day)	NO_2 and NO_3 as N (mg/L)	NO_2 and NO_3 as N (mg/L) LOAD (Lb/day)	Orthophosphate as P (mg/L)	Orthophosphate as P LOAD (Lb/day)	Total phophorus (mg/L)	Total phophorus LOAD (Lb/day)
9/1/1999	0.25	272.2	1.15	1252.3	0.23	250.5	0.3	326.7
10/6/1999	0.10	43.7	1.98	864.6	0.54	235.8	0.56	244.5
10/27/1999	0.17	61.4	2.63	950.0	0.68	245.6	0.77	278.1
11/17/1999	0.05	17.4	2.59	900.6	0.71	246.9	0.73	253.8
12/14/1999	0.10	66.8	1.59	1062.9	0.33	220.6	0.35	234.0
1/5/2000	0.10	64.2	1.71	1097.0	0.41	263.0	0.42	269.4
2/1/2000	0.10	69.0	1.16	800.5	0.32	220.8	0.37	255.3
2/29/2000	0.30	194.1	1.54	996.3	0.53	342.9	0.59	381.7
3/28/2000	0.1	63.6	1.75	1113.3	0.45	286.3	0.49	311.7
4/25/2000	0.2	312.7	1.09	1704.1	0.23	359.6	0.29	453.4
5/9/2000	0.05	48.8	1.07	1044.1	0.24	234.2	0.26	253.7
6/28/2000	0.05	46.1	1.62	1493.4	0.38	350.3	0.42	387.2
8/3/2000	0.3	131.0	2.79	1218.3	0.69	301.3	0.73	318.8
8/12/2000	0.4	136.7	2.81	960.4	0.67	229.0	0.72	246.1
8/31/2000	0.1	29.1	3.54	1030.6	0.91	264.9	0.97	282.4
11/1/2000	0.2	215.6	1.11	1196.8	0.41	442.1	0.55	593.0

Table 5. Analysis Data for Lower Rapid Creek Below WWTP.

Date	TDS (mg/L)	TDS LOAD (Lb/day)	TSS (mg/L)	TSS LOAD (Lb/day)	Total Solids (mg/L)	Total Solids LOAD (Lb/day)	TKN (mg/L)	Fecal Coliform (CFU/100ml)
9/1/1999	390	424709	22	23958	436	474803	0.25	290
10/6/1999	614	268120	7	3057	680	296941	0.5	14
10/27/1999	654	236226	11	3973	706	255009	0.9	10000
11/17/1999	612	212807	2.25	782	686	238539	0.6	9100
12/14/1999	422	282104	11	7353	490	327562	0.6	3400
1/5/2000	438	280994	17	10906	482	309222	0.9	440
2/1/2000	474	327088	42	28982	600	414035	0.9	3100
2/29/2000	464	300175	27	17467	504	326052	1.2	6900
3/28/2000	440	279905	13	8270	508	323163	0.9	2200
4/25/2000	688	1075628	81	126636	838	1310140	1.2	4000
5/9/2000	480	468377	17	16588	530	517166	0.6	220
6/28/2000	486	448031	34	31344	582	536531	0.9	260
8/3/2000	584	255020	65	28384	726	317028	1.5	3700
8/12/2000	542	185253	47	16064	672	229686	1.8	4600
8/31/2000	614	178747	23	6696	686	199707	1.5	850
11/1/2000	410	442069	330	355811	760	819444	1.8	11000

Table 5. Analysis Data for Lower Rapid Creek Below WWTP.

Date	NOTES
9/1/1999	
10/6/1999	
10/27/1999	TNTC
11/17/1999	
12/14/1999	
1/5/2000	
2/1/2000	
2/29/2000	
3/28/2000	
4/25/2000	**EVENT SNOW MELT SAMPLING**
5/9/2000	
6/28/2000	
8/3/2000	
8/12/2000	**EVENT RAIN**
8/31/2000	
11/1/2000	**EVENT RAIN**

Table 5. Analysis Data for Lower Rapid Creek Below WWTP.

Location	Station	Date	WQS Un-ionized ammonia as N, For B.Uses # 4 30 Day Av. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 30 Day Av. (Lb/day)	WQS Un-ionized ammonia as N, For B.Uses # 4 Daily Max. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 Daily Max. (Lb/day)
Rapid Creek near Caputa	06420000	9/2/1999	0.04	36	0.0721	65
Rapid Creek near Caputa	06420000	10/6/1999	0.04	15	0.0716	27
Rapid Creek near Caputa	06420000	10/27/1999	0.04	10	0.0718	19
Rapid Creek near Caputa	06420000	11/17/1999	0.04	13	0.0724	23
Rapid Creek near Caputa	06420000	12/14/1999	0.04	25	0.0721	45
Rapid Creek near Caputa	06420000	1/5/2000	0.04	25	0.0720	45
Rapid Creek near Caputa	06420000	2/1/2000	0.04	26	0.0719	47
Rapid Creek near Caputa	06420000	2/29/2000	0.04	20	0.0723	37
Rapid Creek near Caputa	06420000	3/28/2000	0.04	24	0.0718	42
Rapid Creek near Caputa	06420000	4/21/2000	0.04	48	0.0721	87
Rapid Creek near Caputa	06420000	4/25/2000	0.04	130	0.0721	235
Rapid Creek near Caputa	06420000	5/9/2000	0.04	39	0.0715	69
Rapid Creek near Caputa	06420000	6/28/2000	0.04	34	0.0711	60
Rapid Creek near Caputa	06420000	8/3/2000	0.04	14	0.0714	26
Rapid Creek near Caputa	06420000	8/12/2000	0.04	16	0.0721	29
Rapid Creek near Caputa	06420000	8/31/2000	0.04	10	0.0727	18
Rapid Creek near Caputa	06420001	11/1/2000	0.04	32	0.0728	59

Table 6. Analysis Data for Lower Rapid Creek Near Caputa.

Date	WQS Dissolved Oxygen For B.Uses# 4, #7,and #8 (mg/L)	WQS pH For B.Uses # 4	WQS pH For B.Uses # 4	WQS Water Temp. In F, For B.Uses # 4	WQS Water Temp. In C, For B.Uses # 4	TSS (mg/L) For B.Uses # 4 30 Day AV.	TSS LOAD (Lb/day) For B.Uses # 4 30 Day Av.	TSS (mg/L) For B.Uses # 4 Daily Max. AV.	TSS LOAD (Lb/day) For B.Uses # 4 Daily Max..
9/2/1999	5.0	6.5	6.5 - 9.0	80.0	26.74	90	80543	158	141397
10/6/1999	5.0	6.5	6.5 - 9.0	80.0	26.74	90	33964	158	59625
10/27/1999	5.0	6.5	6.5 - 9.0	80.0	26.74	90	23289	158	40886
11/17/1999	5.0	6.5	6.5 - 9.0	80.0	26.74	90	29112	158	51107
12/14/1999	5.0	6.5	6.5 - 9.0	80.0	26.74	90	56283	158	98808
1/5/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	56283	158	98808
2/1/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	58709	158	103067
2/29/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	46094	158	80920
3/28/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	52886	158	92845
4/21/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	108199	158	189949
4/25/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	293544	158	515333
5/9/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	86850	158	152471
6/28/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	76176	158	133731
8/3/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	32508	158	57070
8/12/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	35905	158	63033
8/31/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	21688	158	38075
11/1/2000	5.0	6.5	6.5 - 9.0	80.0	26.74	90	72780	158	127769

Table 6. Analysis Data for Lower Rapid Creek Near Caputa.

Date	WQS Dissolved Oxygen (mg/L) For B.Uses #7	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses #7	WQS Fecal Coliform In any One Sample. For B.Uses #7and #8	WQS Dissolved Oxygen (mg/L) For B.Uses # 8	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses # 8	WQS Fecal Coliform In any One Sample. For B.Uses # 8	Discharge (cfs)	Air Temp. (deg C)
9/2/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	166	19
10/6/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	70	34
10/27/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	48	12
11/17/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	60	2
12/14/1999	5.0	200/100mL	400	5.00	1000/100mL	2000	116	2
1/5/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	116	6.2
2/1/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	121	0
2/29/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	95	11
3/28/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	109	18
4/21/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	223	10
4/25/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	605	17
5/9/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	179	24
6/28/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	157	22
8/3/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	67	30.5
8/12/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	74	28
8/31/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	44.7	20
11/1/2000	5.0	200/100mL	400	5.00	1000/100mL	2000	150	8

Table 6. Analysis Data for Lower Rapid Creek Near Caputa.

Date	Water Temp. (deg F)	Water Temp. (deg C)	Field conductivity (µS/cm)	Lab conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Field pH	Lab alkalinity (mg/L)	Unionized Ammonia LOAD (Lb/day)	Unionized Ammonia Measured (mg/L)
9/2/1999	64.4	18	598	638	9.54	8.15	158	4.61192	0.005153
10/6/1999	55.4	13	856	900	15.8	8.9	188	2.96943	0.007869
10/27/1999	49.8	9.9	917	958	16	8.8	198	1.36103	0.005260
11/17/1999	45.9	7.7	878	940	16.4	8.66	194	1.19445	0.003693
12/14/1999	36.5	2.5	707	700	14.8	8.48	180	0.97579	0.001560
1/5/2000	33.6	0.9	690	677	13.4	8.21	176	0.43935	0.000703
2/1/2000	32.9	0.5	836	787	14	8.32	188	0.55168	0.000846
2/29/2000	44.2	6.8	779	791	15.6	8.49	178	1.13682	0.002220
3/28/2000	49.8	9.9	712	744	16.6	8.8	181	3.09067	0.005260
4/21/2000	43.7	6.52	800	836	9.5	7.78	113	21.22229	0.017653
4/25/2000	49.1	9.5	844	841	8.58	7.64	113	2.90240	0.000890
5/9/2000	57.1	13.97	755	726	9.11	8.48	180	7.16981	0.007430
6/28/2000	60.1	15.6	747	696	8.25	7.87	182	1.86970	0.002209
8/3/2000	74.5	23.63	624	617	6.76	7.61	130	0.36134	0.001000
8/12/2000	71.6	22	978	1000	6.14	7.71	186	0.44885	0.001125
8/31/2000	63.8	17.65	950	922	7.63	7.83	266	0.25149	0.001044
11/1/2000	47.0	8.32	883	874	9.05	8.14	192	3.61744	0.004473

Table 6. Analysis Data for Lower Rapid Creek Near Caputa.

Date	NH_4 as N (mg/L)	NH_4 as N LOAD (Lb/day)	NO_2 and NO_3 as N (mg/L)	NO_2 and NO_3 as N (mg/L) LOAD (Lb/day)	Orthophosphate as P (mg/L)	Orthophosphate as P LOAD (Lb/day)	Total phophorus (mg/L)
9/2/1999	0.10	89.5	1.21	1082.9	0.26	232.7	0.32
10/6/1999	0.05	18.9	1.74	656.6	0.43	162.3	0.43
10/27/1999	0.05	12.9	1.56	403.7	0.4	103.5	0.44
11/17/1999	0.05	16.2	0.95	307.3	0.39	126.2	0.43
12/14/1999	0.05	31.3	1.62	1013.1	0.33	206.4	0.36
1/5/2000	0.05	31.3	1.26	788.0	0.29	181.4	0.31
2/1/2000	0.05	32.6	1.3	848.0	0.35	228.3	0.39
2/29/2000	0.05	25.6	1.33	681.2	0.35	179.3	0.38
3/28/2000	0.05	29.4	0.8	470.1	0.28	164.5	0.33
4/21/2000	2	2404.4	0.73	877.6	0.41	492.9	0.53
4/25/2000	0.1	326.2	0.56	1826.5	0.54	1761.3	0.66
5/9/2000	0.1	96.5	1.07	1032.6	0.26	250.9	0.28
6/28/2000	0.1	84.6	1.27	1074.9	0.41	347.0	0.47
8/3/2000	0.05	18.1	1.53	552.6	0.36	130.0	0.43
8/12/2000	0.05	19.9	3.03	1208.8	0.68	271.3	0.75
8/31/2000	0.05	12.0	2.59	624.1	0.6	144.6	0.64
11/1/2000	0.2	161.7	2.12	1714.4	1.07	865.3	1.32

Table 6. Analysis Data for Lower Rapid Creek Near Caputa.

Date	Total phophorus LOAD (Lb/day)	TDS (mg/L)	TDS LOAD (Lb/day)	TSS (mg/L)	TSS LOAD (Lb/day)	Total Solids (mg/L)	Total Solids LOAD (Lb/day)	TKN (mg/L)	Fecal Coliform (CFU/100ml)
9/2/1999	286.4	394	352598	47	42061	434	388395	0.25	200
10/6/1999	162.3	586	221142	7	2642	636	240011	0.25	1
10/27/1999	113.9	618	159921	9	2329	650	168202	0.6	122
11/17/1999	139.1	610	197314	6	1941	674	218015	0.5	76
12/14/1999	225.1	434	271409	19	11882	500	312683	2.25	780
1/5/2000	193.9	428	267656	36	22513	486	303927	0.9	890
2/1/2000	254.4	484	315723	31	20222	576	375737	0.9	148
2/29/2000	194.6	500	256076	23	11780	536	274514	0.9	400
3/28/2000	193.9	440	258556	15	8814	518	304391	0.6	4
4/21/2000	637.2	494	593892	232	278913	758	911276	1.8	2750
4/25/2000	2152.7	580	1891730	400	1304641	994	3242033	1.8	5500
5/9/2000	270.2	484	467062	59	56935	584	563562	0.9	48
6/28/2000	397.8	448	379187	98	82947	598	506147	1.2	620
8/3/2000	155.3	402	145203	80	28896	548	197939	1.2	5300
8/12/2000	299.2	670	267290	90	35905	848	338301	1.2	700
8/31/2000	154.2	656	158084	54	13013	770	185556	0.9	250
11/1/2000	1067.4	560	452851	520	420504	1200	970394	2.7	1800

Table 6. Analysis Data for Lower Rapid Creek Near Caputa.

Date	Notes
9/2/1999	
10/6/1999	
10/27/1999	
11/17/1999	
12/14/1999	
1/5/2000	
2/1/2000	
2/29/2000	
3/28/2000	
4/21/2000	**EVENT SNOW MELT SAMPLING**
4/25/2000	**EVENT SNOW MELT SAMPLING**
5/9/2000	
6/28/2000	
8/3/2000	
8/12/2000	**EVENT RAIN**
8/31/2000	
11/1/2000	**EVENT RAIN**

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Table 6. Analysis Data for Lower Rapid Creek Near Caputa.

Location	Station	Date	WQS Un-ionized ammonia as N, For B.Uses # 4 30 Day Av. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 30 Day Av. (Lb/day)	WQS Un-ionized ammonia as N, For B.Uses # 4 Daily Max. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 Daily Max. (Lb/day)
Rapid Creek near Farmingdale	06412500	9/2/1999	0.04	38	0.0713	67
Rapid Creek near Farmingdale	06412500	10/7/1999	0.04	17	0.0722	30
Rapid Creek near Farmingdale	06412500	10/27/1999	0.04	14	0.0755	26
Rapid Creek near Farmingdale	06412500	11/18/1999	0.04	16	0.0722	29
Rapid Creek near Farmingdale	06412500	12/14/1999	0.04	20	0.0741	37
Rapid Creek near Farmingdale	06412500	1/5/2000	0.04	24	0.0680	41
Rapid Creek near Farmingdale	06412500	2/1/2000	0.04	15	0.0680	26
Rapid Creek near Farmingdale	06412500	2/29/2000	0.04	22	0.0720	39
Rapid Creek near Farmingdale	06412500	3/28/2000	0.04	22	0.0704	38
Rapid Creek near Farmingdale	06412500	4/21/2000	0.04	94	0.0751	176
Rapid Creek near Farmingdale	06412500	4/25/2000	0.04	241	0.0721	434
Rapid Creek near Farmingdale	06412500	5/9/2000	0.04	47	0.0716	84
Rapid Creek near Farmingdale	06412500	6/28/2000	0.04	31	0.0903	71
Rapid Creek near Farmingdale	06412500	8/3/2000	0.04	20	0.0713	36
Rapid Creek near Farmingdale	06412500	8/12/2000	0.04	3	0.6300	52
Rapid Creek near Farmingdale	06412500	8/31/2000	0.04	7	0.0732	13
Rapid Creek near Farmingdale	06412501	11/1/2000	0.04	21	0.0722	37

Table 7. Analysis Data for Lower Rapid Creek Near Farmingdale.

Date	WQS Dissolved Oxygen For B.Uses # 4, #7and # 8 (mg/L)	WQS pH For B.Uses # 4	WQS pH For B.Uses # 4	WQS Water Temp. In F, For B.Uses # 4	TSS (mg/L) For B.Uses # 4 30 Day AV.	TSS LOAD (Lb/day) For B.Uses # 4 30 Day Av.	TSS (mg/L) For B.Uses # 4 Daily Max. AV.	TSS LOAD (Lb/day) For B.Uses # 4 Daily Max..	WQS Dissolved Oxygen (mg/L) For B.Uses #7
9/2/1999	5.0	6.5	6.5 - 9.0	80	90	84424	158	148212	5.0
10/7/1999	5.0	6.5	6.5 - 9.0	80	90	37360	158	65588	5.0
10/27/1999	5.0	6.5	6.5 - 9.0	80	90	31538	158	55366	5.0
11/18/1999	5.0	6.5	6.5 - 9.0	80	90	36390	158	63884	5.0
12/14/1999	5.0	6.5	6.5 - 9.0	80	90	45123	158	79217	5.0
1/5/2000	5.0	6.5	6.5 - 9.0	80	90	54342	158	95401	5.0
2/1/2000	5.0	6.5	6.5 - 9.0	80	90	33964	158	59625	5.0
2/29/2000	5.0	6.5	6.5 - 9.0	80	90	48520	158	85179	5.0
3/28/2000	5.0	6.5	6.5 - 9.0	80	90	48520	158	85179	5.0
4/21/2000	5.0	6.5	6.5 - 9.0	80	90	211546	158	371381	5.0
4/25/2000	5.0	6.5	6.5 - 9.0	80	90	541965	158	951450	5.0
5/9/2000	5.0	6.5	6.5 - 9.0	80	90	105094	158	184498	5.0
6/28/2000	5.0	6.5	6.5 - 9.0	80	90	70839	158	124361	5.0
8/3/2000	5.0	6.5	6.5 - 9.0	80	90	45366	158	79642	5.0
8/12/2000	5.0	6.5	6.5 - 9.0	80	90	7472	158	13118	5.0
8/31/2000	5.0	6.5	6.5 - 9.0	80	90	16012	158	28109	5.0
11/1/2000	5.0	6.5	6.5 - 9.0	80	90	46579	158	81772	5.0

Table 7. Analysis Data for Lower Rapid Creek Near Farmingdale.

Date	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses #7	WQS Fecal Coliform In any One Sample. For B.Uses # 7and # 8	WQS Dissolved Oxygen (mg/L) For B.Uses # 8	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses # 8	WQS Fecal Coliform In any One Sample. For B.Uses # 8	Discharge (cfs)	Air Temp. (deg C)	Water Temp. (deg F)
9/2/1999	200/100mL	400	5.00	1000/100mL	2000	174	18	66.4
10/7/1999	200/100mL	400	5.00	1000/100mL	2000	77	17	54.0
10/27/1999	200/100mL	400	5.00	1000/100mL	2000	65	18	49.3
11/18/1999	200/100mL	400	5.00	1000/100mL	2000	75	2	39.7
12/14/1999	200/100mL	400	5.00	1000/100mL	2000	93	4	34.2
1/5/2000	200/100mL	400	5.00	1000/100mL	2000	112	2.5	32.7
2/1/2000	200/100mL	400	5.00	1000/100mL	2000	70	5	32.7
2/29/2000	200/100mL	400	5.00	1000/100mL	2000	100	12	44.2
3/28/2000	200/100mL	400	5.00	1000/100mL	2000	100	17	51.1
4/21/2000	200/100mL	400	5.00	1000/100mL	2000	436	9	40.3
4/25/2000	200/100mL	400	5.00	1000/100mL	2000	1117	16	47.6
5/9/2000	200/100mL	400	5.00	1000/100mL	2000	216.6	26	58.9
6/28/2000	200/100mL	400	5.00	1000/100mL	2000	146	26	60.8
8/3/2000	200/100mL	400	5.00	1000/100mL	2000	93.5	30.5	76.3
8/12/2000	200/100mL	400	5.00	1000/100mL	2000	15.4	30	74.3
8/31/2000	200/100mL	400	5.00	1000/100mL	2000	33	18	46.9
11/1/2000	200/100mL	400	5.00	1000/100mL	2000	96	8	47.5

Table 7. Analysis Data for Lower Rapid Creek Near Farmingdale.

Date	Water Temp. (deg C)	Field conductivity (µS/cm)	Lab conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Field pH	Lab alkalinity (mg/L)	Unionized Ammonia LOAD (Lb/day)	Unionized Ammonia Calculated (mg/L)	NH_4 as N (mg/L)
9/2/1999	19.1	613	661	9.83	8.39	164	3.97966	0.004242	0.05
10/7/1999	12.2	852	908	12.80	8.85	196	3.05996	0.007371	0.05
10/27/1999	9.6	1013	1060	12.40	8.78	206	1.84306	0.005260	0.05
11/18/1999	4.3	995	1020	10.80	8.44	210	0.59175	0.001464	0.05
12/14/1999	1.2	728	718	13.80	8.53	180	0.72180	0.001440	0.05
1/5/2000	0.4	739	723	14.20	8.37	184	0.61426	0.001017	0.05
2/1/2000	0.4	1018	942	14.20	8.42	188	0.38391	0.001017	0.05
2/29/2000	6.8	878	893	14.40	8.65	180	1.84856	0.003429	0.05
3/28/2000	10.6	747	796	12.00	9	187	4.51981	0.008384	0.05
4/21/2000	4.62	823	864	9.80	7.82	152	7.35898	0.003131	0.4
4/25/2000	8.68	817	811	8.50	7.75	111	6.47339	0.001075	0.1
5/9/2000	14.95	782	800	7.76	8.24	162	3.02476	0.002590	0.05
6/28/2000	16	784	727	7.95	7.92	186	1.12877	0.001434	0.05
8/3/2000	24.62	932	929	7.29	8.01	184	1.31725	0.002613	0.05
8/12/2000	23.5	941	970	8.77	8.38	200	0.47264	0.005693	0.05
8/31/2000	8.3	965	919	7.59	8.08	116	0.18160	0.001021	0.05
11/1/2000	8.62	896	874	9.89	8.41	190	4.18419	0.008085	0.2

Table 7. Analysis Data for Lower Rapid Creek Near Farmingdale.

Date	NH_4 as N LOAD (Lb/day)	NO_2 and NO_3 as N (mg/L)	NO_2 and NO_3 as N (mg/L) LOAD (Lb/day)	Orthophosphate as P (mg/L)	Orthophosphate as P LOAD (Lb/day)	Total phophorus (mg/L)	Total phophorus LOAD (Lb/day)	TDS (mg/L)
9/2/1999	46.9	0.84	788.0	0.28	262.7	0.36	337.7	404
10/7/1999	20.8	0.76	315.5	0.27	112.1	0.3	124.5	590
10/27/1999	17.5	2.01	704.3	0.32	112.1	0.36	126.2	692
11/18/1999	20.2	1.92	776.3	0.41	165.8	0.47	190.0	644
12/14/1999	25.1	1.63	817.2	0.26	130.4	0.36	180.5	446
1/5/2000	30.2	1.56	941.9	0.28	169.1	0.29	175.1	452
2/1/2000	18.9	1.43	539.6	0.31	117.0	0.31	117.0	554
2/29/2000	27.0	1.25	673.9	0.24	129.4	0.29	156.3	560
3/28/2000	27.0	0.79	425.9	0.24	129.4	0.29	156.3	484
4/21/2000	940.2	0.83	1950.9	1.15	2703.1	1.17	2750.1	558
4/25/2000	602.2	0.58	3492.7	0.9	5419.7	0.99	5961.6	560
5/9/2000	58.4	0.91	1062.6	0.24	280.2	0.28	327.0	508
6/28/2000	39.4	1.27	999.6	0.35	275.5	0.42	330.6	482
8/3/2000	25.2	2.15	1083.7	0.43	216.7	0.48	242.0	644
8/12/2000	4.2	0.85	70.6	0.24	19.9	0.3	24.9	638
8/31/2000	8.9	1.95	346.9	0.35	62.3	0.42	74.7	672
11/1/2000	103.5	1.37	709.0	0.44	227.7	0.49	253.6	580

Table 7. Analysis Data for Lower Rapid Creek Near Farmingdale.

Date	TDS LOAD (Lb/day)	TSS (mg/L)	TSS LOAD (Lb/day)	Total Solids (mg/L)	Total Solids LOAD (Lb/day)	TKN (mg/L)	Fecal Coliform (CFU/100ml)	Notes
9/2/1999	378971	79	74106	470	440882	0.25	170	
10/7/1999	244917	18	7472	642	266503	0.6	4	
10/27/1999	242491	6	2103	728	255106	0.6	4	
11/18/1999	260389	23	9300	708	286266	1.2	38	
12/14/1999	223611	22	11030	528	264724	0.5	170	
1/5/2000	272918	34	20529	522	315184	0.9	146	
2/1/2000	209066	7	2642	668	252087	0.6	1	
2/29/2000	301900	50	26955	636	342873	0.9	58	
3/28/2000	260928	30	16173	582	313761	0.6	14	
4/21/2000	1311585	776	1823996	1370	3220200	1.2	5200	EVENT SNOW MELT SAMPLING
4/25/2000	3372228	764	4600683	1250	7527295	2.1	10000	EVENT SNOW MELT SAMPLING
5/9/2000	593196	114	133119	678	791706	0.9	62	
6/28/2000	379381	122	96026	632	497446	0.9	190	
8/3/2000	324618	79	39821	818	412326	1.2	140	
8/12/2000	52968	30	2491	764	63429	1.2	30	EVENT RAIN
8/31/2000	119553	53	9429	798	141969	0.9	116	
11/1/2000	300175	120	62105	770	398509	1.2	400	EVENT RAIN

Table 7. Analysis Data for Lower Rapid Creek Near Farmingdale.

Location	Station	Date	WQS Un-ionized ammonia as N, For B.Uses # 4 30 Day Av. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 30 Day Av. (Lb/day)	WQS Un-ionized ammonia as N, For B.Uses # 4 Daily Max. (mg/L)	WQS Un-ionized ammonia as N, (LOAD) For B.Uses #4 Daily Max. (Lb/day)	WQS Dissolved Oxygen For B.Uses# 4,#7,#8 (mg/L)
RapidCreek at Creston	06422000	9/2/1999	0.04	38	0.0714	67	5.0
RapidCreek at Creston	06422000	10/7/1999	0.04	17	0.0710	31	5.0
RapidCreek at Creston	06422000	10/28/1999	0.04	13	0.0719	24	5.0
RapidCreek at Creston	06422000	11/18/1999	0.04	13	0.0724	23	5.0
RapidCreek at Creston	06422000	12/14/1999	0.04	28	0.0719	50	5.0
RapidCreek at Creston	06422000	1/5/2000	0.04	31	0.0720	57	5.0
RapidCreek at Creston	06422000	2/1/2000	0.04	18	0.0719	33	5.0
RapidCreek at Creston	06422000	2/29/2000	0.04	21	0.0718	37	5.0
RapidCreek at Creston	06422000	3/28/2000	0.04	22	0.0715	40	5.0
RapidCreek at Creston	06422000	4/21/2000	0.04	87	0.0723	157	5.0
RapidCreek at Creston	06422000	4/25/2000	0.04	302	0.0721	544	5.0
RapidCreek at Creston	06422000	5/9/2000	0.04	52	0.0721	93	5.0
RapidCreek at Creston	06422000	6/28/2000	0.04	28	0.0720	50	5.0
RapidCreek at Creston	06422000	8/3/2000	0.04	20	0.0724	36	5.0
RapidCreek at Creston	06422000	8/12/2000	0.04	5	0.0726	10	5.0
RapidCreek at Creston	06422000	8/31/2000	0.04	8	0.0720	15	5.0
RapidCreek at Creston	06422001	11/1/2000	0.04	22	0.0723	39	5.0

Table 8. Analysis Data for Lower Rapid Creek at Creston

Date	WQS pH For B.Uses # 4	WQS pH For B.Uses # 4	WQS Water Temp. In F, For B.Uses # 4	TSS (mg/L) For B.Uses # 4 30 Day AV.	TSS LOAD (Lb/day) For B.Uses # 4 30 Day Av.	TSS (mg/L) For B.Uses # 4 Daily Max. AV.	TSS LOAD (Lb/day) For B.Uses # 4 Daily Max..	WQS Dissolved Oxygen (mg/L) For B.Uses #7
9/2/1999	6.5	6.5 - 9.0	80	90	84910	158	149063	5.0
10/7/1999	6.5	6.5 - 9.0	80	90	39301	158	68995	5.0
10/28/1999	6.5	6.5 - 9.0	80	90	29597	158	51959	5.0
11/18/1999	6.5	6.5 - 9.0	80	90	28141	158	49404	5.0
12/14/1999	6.5	6.5 - 9.0	80	90	62105	158	109029	5.0
1/5/2000	6.5	6.5 - 9.0	80	90	70839	158	124361	5.0
2/1/2000	6.5	6.5 - 9.0	80	90	41242	158	72402	5.0
2/29/2000	6.5	6.5 - 9.0	80	90	46579	158	81772	5.0
3/28/2000	6.5	6.5 - 9.0	80	91	50531	158	87734	5.0
4/21/2000	6.5	6.5 - 9.0	80	90	195049	158	342420	5.0
4/25/2000	6.5	6.5 - 9.0	80	92	694371	158	1192507	5.0
5/9/2000	6.5	6.5 - 9.0	80	90	116447	158	204430	5.0
6/28/2000	6.5	6.5 - 9.0	80	93	65178	158	110733	5.0
8/3/2000	6.5	6.5 - 9.0	80	90	45123	158	79217	5.0
8/12/2000	6.5	6.5 - 9.0	80	94	12669	158	21295	5.0
8/31/2000	6.5	6.5 - 9.0	80	90	18923	158	33220	5.0
11/1/2000	6.5	6.5 - 9.0	80	90	48520	158	85179	5.0

Table 8. Analysis Data for Lower Rapid Creek at Creston

Date	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses #7	WQS Fecal Coliform In any One Sample. For B.Uses #7 and #8	WQS Dissolved Oxygen (mg/L) For B.Uses # 8	WQS Fecal Coliform from May - Sept. 30 Geo.Mean For B.Uses # 8	WQS Fecal Coliform In any One Sample. For B.Uses # 8	Discharge (cfs)	Air Temp. (deg C)	Water Temp. (deg F)
9/2/1999	200/100mL	400	5.00	1000/100mL	2000	175	19	67.5
10/7/1999	200/100mL	400	5.00	1000/100mL	2000	81	21	54.5
10/28/1999	200/100mL	400	5.00	1000/100mL	2000	61	13	42.6
11/18/1999	200/100mL	400	5.00	1000/100mL	2000	58	1	38.1
12/14/1999	200/100mL	400	5.00	1000/100mL	2000	128	4	33.1
1/5/2000	200/100mL	400	5.00	1000/100mL	2000	146	3.4	32.9
2/1/2000	200/100mL	400	5.00	1000/100mL	2000	85	3	32.5
2/29/2000	200/100mL	400	5.00	1000/100mL	2000	96	12	45.5
3/28/2000	200/100mL	400	5.00	1000/100mL	2000	103	17	52.3
4/21/2000	200/100mL	400	5.00	1000/100mL	2000	402	9	36.9
4/25/2000	200/100mL	400	5.00	1000/100mL	2000	1400	14	47.2
5/9/2000	200/100mL	400	5.00	1000/100mL	2000	240	22	60.2
6/28/2000	200/100mL	400	5.00	1000/100mL	2000	130	11.5	60.6
8/3/2000	200/100mL	400	5.00	1000/100mL	2000	93	32	80.2
8/12/2000	200/100mL	400	5.00	1000/100mL	2000	25	30	76.3
8/31/2000	200/100mL	400	5.00	1000/100mL	2000	39	20	65.4
11/1/2000	200/100mL	400	5.00	1000/100mL	2000	100	10	47.8

Table 8. Analysis Data for Lower Rapid Creek at Creston

Date	Water Temp. (deg C)	Field conductivity (µS/cm)	Lab conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Field pH	Lab alkalinity (mg/L)	Unionized Ammonia LOAD (Lb/day)	Unionized Ammonia Calculated (mg/L)	NH_4 as N (mg/L)
9/2/1999	19.7	668	708	9.54	8.44	168	4.27959	0.004536	0.05
10/7/1999	12.5	888	938	11.8	9.04	192	4.02855	0.009225	0.05
10/28/1999	5.9	1035	1060	11.8	8.52	208	0.67592	0.002055	0.05
11/18/1999	3.4	1111	1120	11.3	8.57	204	0.63384	0.002027	0.05
12/14/1999	0.6	703	690	13.3	8.4	180	0.76210	0.001104	0.05
1/5/2000	0.5	758	745	13.4	8.38	190	0.83437	0.001060	0.05
2/1/2000	0.3	933	876	13.3	8.35	192	0.46618	0.001017	0.05
2/29/2000	7.5	1182	1170	12.3	8.54	180	1.19347	0.002306	0.05
3/28/2000	11.3	787	835	11.1	8.88	187	3.24056	0.005836	0.05
4/21/2000	2.73	1004	1480	11.7	8.35	154	2.81444	0.001299	0.05
4/25/2000	8.45	718	718	9.11	7.5	91	1.88926	0.000250	0.05
5/9/2000	15.65	885	906	7.74	8.24	180	7.19895	0.005564	0.1
6/28/2000	15.9	861	805	8.28	7.63	178	0.40716	0.000581	0.05
8/3/2000	26.8	978	980	6.91	8.16	192	2.35709	0.004701	0.05
8/12/2000	24.6	956	973	9.81	8.3	164	0.66556	0.004938	0.05
8/31/2000	18.53	960	988	7.48	8.13	192	0.45064	0.002143	0.05
11/1/2000	8.76	861	849	10.29	8.48	190	5.56888	0.010330	0.2

Table 8. Analysis Data for Lower Rapid Creek at Creston

Date	NH_4 as N LOAD (Lb/day)	NO_2 and NO_3 as N (mg/L)	NO_2 and NO_3 as N (mg/L) LOAD (Lb/day)	Orthophosphate as P (mg/L)	Orthophosphate as P LOAD (Lb/day)	Total phophorus (mg/L)	Total phophorus LOAD (Lb/day)	TDS (mg/L)
9/2/1999	47.2	0.88	830.2	0.26	245.3	0.34	320.8	430
10/7/1999	21.8	0.51	222.7	0.17	74.2	0.19	83.0	648
10/28/1999	16.4	0.94	309.1	0.03	9.9	0.04	13.2	668
11/18/1999	15.6	1.62	506.5	0.3	93.8	0.29	90.7	750
12/14/1999	34.5	1.32	910.9	0.24	165.6	0.31	213.9	432
1/5/2000	39.4	1.55	1220.0	0.3	236.1	0.32	251.9	468
2/1/2000	22.9	1.43	655.3	0.3	137.5	0.33	151.2	536
2/29/2000	25.9	0.97	502.0	0.22	113.9	0.28	144.9	694
3/28/2000	27.8	0.98	544.2	0.22	122.2	0.27	149.9	514
4/21/2000	108.4	0.1	216.7	0.2	433.4	0.2	433.4	1080
4/25/2000	377.4	0.34	2566.2	2.06	15547.9	2.07	15623.3	486
5/9/2000	129.4	1.38	1785.5	0.53	685.7	0.57	737.5	572
6/28/2000	35.0	1.42	995.2	0.38	266.3	0.41	287.3	560
8/3/2000	25.1	0.51	255.7	0.46	230.6	0.61	305.8	658
8/12/2000	6.7	0.025	3.4	0.04	5.4	0.1	13.5	658
8/31/2000	10.5	0.52	109.3	0.2	42.1	0.28	58.9	680
11/1/2000	107.8	1.23	663.1	0.35	188.7	0.41	221.0	570

Table 8. Analysis Data for Lower Rapid Creek at Creston

Date	TDS LOAD (Lb/day)	TSS (mg/L)	TSS LOAD (Lb/day)	Total Solids (mg/L)	Total Solids LOAD (Lb/day)	TKN (mg/L)	Fecal Coliform (CFU/100ml)	Notes
9/2/1999	405679	99	93400	554	522665	0.8	104	
10/7/1999	282967	20	8734	678	296067	0.25	8	
10/28/1999	219676	2.25	740	722	237434	0.25	4	
11/18/1999	234512	11	3440	812	253898	1.2	16	
12/14/1999	298105	110	75906	590	407134	2.25	14	
1/5/2000	368362	121	95239	622	489575	0.9	22	
2/1/2000	245618	24	10998	644	295108	0.6	4	
2/29/2000	359175	104	53825	816	422316	0.9	6	
3/28/2000	285415	64	35538	644	357601	0.6	1	
4/21/2000	2340591	78	169043	1200	2600657	1.2	610	EVENT SNOW MELT SAMPLING
4/25/2000	3668090	2130	16076199	2600	19623529	3	3800	EVENT SNOW MELT SAMPLING
5/9/2000	740087	406	525307	1080	1397368	1.2	330	
6/28/2000	392471	168	117741	790	553664	0.9	250	
8/3/2000	329902	309	154923	1090	546494	1.8	540	
8/12/2000	88683	23	3100	772	104048	0.9	26	EVENT RAIN, Estimated Flow
8/31/2000	142971	68	14297	826	173668	0.25	130	
11/1/2000	307292	120	64693	720	388158	1.2	80	EVENT RAIN

Table 8. Analysis Data for Lower Rapid Creek at Creston

APPENDIX 2

Sample Date 10/6/1999

Sample Site	Field pH	WQS pH	WQS pH Range
RC - Above Canyon Lake	8.11	6.6	6.6 - 8.6
RC - Below Park Drive	8.5	6.6	6.6 - 8.6
RC - Below Hawthorne Ditch	8.6	6.6	6.6 - 8.6
RC - Above WWTP	8.22	6.5	6.5 - 9.0
RC - Below WWTP	8.26	6.5	6.5 - 9.0
RC - Near Caputa	8.9	6.5	6.5 - 9.0
RC - Near Farmingdale	8.85	6.5	6.5 - 9.0
RC - At Creston	9.04	6.5	6.5 - 9.0

Sample Date 10/27/1999

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	4	400	2000
RC - Below Park Drive	2	400	2000
RC - Below Hawthorne Ditch	20	400	2000
RC - Above WWTP	12	400	2000
RC - Below WWTP (TNTC)	10000	400	2000
RC - Near Caputa	122	400	2000
RC - Near Farmingdale	4	400	2000
RC - At Creston	4	400	2000

Sample Date 11/17/1999

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	16	400	2000
RC - Below Park Drive	2	400	2000
RC - Below Hawthorne Ditch	2	400	2000
RC - Above WWTP	2	400	2000
RC - Below WWTP	9100	400	2000
RC - Near Caputa	76	400	2000
RC - Near Farmingdale	38	400	2000
RC - At Creston	16	400	2000

Sample Date 12/14/1999

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	2	400	2000
RC - Below Park Drive	6	400	2000
RC - Below Hawthorne Ditch	10	400	2000
RC - Above WWTP	1	400	2000
RC - Below WWTP	3400	400	2000
RC - Near Caputa	780	400	2000
RC - Near Farmingdale	170	400	2000
RC - At Creston	14	400	2000

Table 10. Water Quality Standard Violations Detected on Lower Rapid Creek.

Sample Date 1/5/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	Unionized Ammonia as N Load (Lb/day)
RC - Above Canyon Lake	1	400	2000
RC - Below Park Drive	20	400	2000
RC - Below Hawthorne Ditch	12	400	2000
RC - Above WWTP	1	400	2000
RC - Below WWTP	440	400	2000
RC - Near Caputa	890	400	2000
RC - Near Farmingdale	146	400	2000
RC - At Creston	22	400	2000

Sample Date 2/1/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	6	400	2000
RC - Below Park Drive	20	400	2000
RC - Below Hawthorne Ditch	4	400	2000
RC - Above WWTP	4	400	2000
RC - Below WWTP	3100	400	2000
RC - Near Caputa	148	400	2000
RC - Near Farmingdale	1	400	2000
RC - At Creston	4	400	2000

Sample Date 2/29/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	20	400	2000
RC - Below Park Drive	78	400	2000
RC - Below Hawthorne Ditch	8	400	2000
RC - Above WWTP	1	400	2000
RC - Below WWTP	6900	400	2000
RC - Near Caputa	400	400	2000
RC - Near Farmingdale	58	400	2000
RC - At Creston	6	400	2000

Sample Date 3/28/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	4	400	2000
RC - Below Park Drive	2	400	2000
RC - Below Hawthorne Ditch	1	400	2000
RC - Above WWTP	2	400	2000
RC - Below WWTP	2200	400	2000
RC - Near Caputa	4	400	2000
RC - Near Farmingdale	14	400	2000
RC - At Creston	1	400	2000

Table 10. Water Quality Standard Violations Detected on Lower Rapid Creek.

Sample Date 4/21/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	1	400	2000
RC - Below Park Drive	1	400	2000
RC - Below Hawthorne Ditch	250	400	2000
RC - Above WWTP	1200	400	2000
RC - Near Caputa	2750	400	2000
RC - Near Farmingdale	5200	400	2000
RC - At Creston	610	400	2000

Sample Date 4/21/2000

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)
RC - Above Canyon Lake	946	22287
RC - Below Park Drive	1310	30859
RC - Below Hawthorne Ditch	185259	69146
RC - Above WWTP	65663	247019
RC - Near Caputa	278913	189949
RC - Near Farmingdale	1823996	371381
RC - At Creston	169043	342420

Sample Date 4/25/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	1	400	2000
RC - Below Park Drive	1	400	2000
RC - Below Hawthorne Ditch	34	400	2000
RC - Above WWTP	1100	400	2000
RC - Below WWTP	4000	400	2000
RC - Near Caputa	5500	400	2000
RC - Near Farmingdale	10000	400	2000
RC - At Creston	3800	400	2000

Sample Date 4/25/2000

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)
RC - Above Canyon Lake	13931	38859
RC - Below Park Drive	2906	22001
RC - Below Hawthorne Ditch	21737	54860
RC - Above WWTP	104921	224021
RC - Below WWTP	126636	247019
RC - Near Caputa	1304641	515333
RC - Near Farmingdale	4600683	951450
RC - At Creston	16076199	1192507

Table 10. Water Quality Standard Violations Detected on Lower Rapid Creek.

Sample Date 5/9/2000

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)
RC - Above Canyon Lake	3574	37887
RC - Below Park Drive	6987	41145
RC - Below Hawthorne Ditch	8572	45431
RC - Above WWTP	13887	137138
RC - Below WWTP	16588	154174
RC - Near Caputa	56935	152471
RC - Near Farmingdale	133119	184498
RC - At Creston	525307	204430

Sample Date 6/28/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	12	400	2000
RC - Below Park Drive	12	400	2000
RC - Below Hawthorne Ditch	120	400	2000
RC - Above WWTP	350	400	2000
RC - Below WWTP	260	400	2000
RC - Near Caputa	620	400	2000
RC - Near Farmingdale	190	400	2000
RC - At Creston	250	400	2000

Sample Date 6/28/2000

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)
RC - Above Canyon Lake	1092	25715
RC - Below Park Drive	1262	29716
RC - Below Hawthorne Ditch	3558	31430
RC - Above WWTP	19408	127769
RC - Below WWTP	31344	145656
RC - Near Caputa	82947	133731
RC - Near Farmingdale	96026	124361
RC - At Creston	117741	110733

Sample Date 6/28/2000

Sample Site	Field pH	WQS pH for B.Uses #1, #2 and #4	WQS pH Range
RC - Above Canyon Lake	8.23	6.6	6.6 - 8.6
RC - Below Park Drive	9.97	6.6	6.6 - 8.6
RC - Below Hawthorne Ditch	8.03	6.6	6.6 - 8.6
RC - Above WWTP	7.74	6.5	6.5 - 9.0
RC - Below WWTP	7.74	6.5	6.5 - 9.0
RC - Near Caputa	7.87	6.5	6.5 - 9.0
RC - Near Farmingdale	7.92	6.5	6.5 - 9.0
RC - At Creston	7.63	6.5	6.5 - 9.0

Table 10. Water Quality Standard Violations Detected on Lower Rapid Creek.

Sample Date 8/3/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	82	400	2000
RC - Below Park Drive	44	400	2000
RC - Below Hawthorne Ditch	1600	400	2000
RC - Above WWTP	2600	400	2000
RC - Below WWTP	3700	400	2000
RC - Near Caputa	5300	400	2000
RC - Near Farmingdale	140	400	2000
RC - At Creston	540	400	2000

Sample Date 8/3/2000

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)
RC - Above Canyon Lake	807	19001
RC - Below Park Drive	2210	23430
RC - Below Hawthorne Ditch	4151	22001
RC - Above WWTP	21349	51107
RC - Below WWTP	28384	68995
RC - Near Caputa	28896	57070
RC - Near Farmingdale	39821	79642
RC - At Creston	154923	79217

Sample Date 8/3/2000

Sample Site	Water Temp (deg F)	WQS Water Temp (deg F)
RC - Above Canyon Lake	57.4	65
RC - Below Park Drive	63.3	65
RC - Below Hawthorne Ditch	46.9	65
RC - Above WWTP	69.4	80
RC - Below WWTP	70.0	80
RC - Near Caputa	74.5	80
RC - Near Farmingdale	76.3	80
RC - At Creston	80.2	80

Sample Date 8/11/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	102	400	2000
RC - Below Park Drive	220	400	2000
RC - Below Hawthorne Ditch	510	400	2000
RC - Above WWTP	490000	400	2000
RC - Below WWTP	4600	400	2000
RC - Near Caputa	700	400	2000
RC - Near Farmingdale	30	400	2000
RC - At Creston	26	400	2000

Table 10. Water Quality Standard Violations Detected on Lower Rapid Creek.

Sample Date 8/11/2000

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)
RC - Above Canyon Lake	643	15144
RC - Below Park Drive	15802	13086
RC - Below Hawthorne Ditch	931579	85718
RC - Above WWTP	12572	37479
RC - Below WWTP	16064	54004
RC - Near Caputa	35905	63033
RC - Near Farmingdale	2491	13118
RC - At Creston	3100	21295

Sample Date 8/11/2000

Sample Site	Water Temp (deg F)	WQS Water Temp (deg F)
RC - Above Canyon Lake	69.1	65
RC - Below Park Drive	68.4	65
RC - Below Hawthorne Ditch	72.6	65
RC - Above WWTP	69.4	80
RC - Below WWTP	69.8	80
RC - Near Caputa	71.6	80
RC - Near Farmingdale	74.3	80
RC - At Creston	76.3	80

Sample Date 8/11/2000

Sample Site	DO (mg/L)	WQS DO (mg/L)
RC - Above Canyon Lake	7.47	6.0
RC - Below Park Drive	7.63	6.0
RC - Below Hawthorne Ditch	2.87	6.0
RC - Above WWTP	5.25	5.0
RC - Below WWTP	5.96	5.0
RC - Near Caputa	6.14	5.0
RC - Near Farmingdale	8.77	5.0
RC - At Creston	9.81	5.0

Sample Date 8/31/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	220	400	2000
RC - Below Park Drive	30	400	2000
RC - Below Hawthorne Ditch	290	400	2000
RC - Above WWTP	280	400	2000
RC - Below WWTP	850	400	2000
RC - Near Caputa	250	400	2000
RC - Near Farmingdale	116	400	2000
RC - At Creston	130	400	2000

Table 10. Water Quality Standard Violations Detected on Lower Rapid Creek.

Sample Date 11/1/2000

Sample Site	Fecal Coliform (CFU/100 mL)	WQS Fecal Coliform for B.Uses #7 and #8	WQS Fecal Coliform for B.Uses #8
RC - Above Canyon Lake	46	400	2000
RC - Below Park Drive	74	400	2000
RC - Below Hawthorne Ditch	6100	400	2000
RC - Above WWTP	4500	400	2000
RC - Below WWTP	11000	400	2000
RC - Near Caputa	1800	400	2000
RC - Near Farmingdale	400	400	2000
RC - At Creston	80	400	2000

Table 10. Water Quality Standard Violations Detected on Lower Rapid Creek.

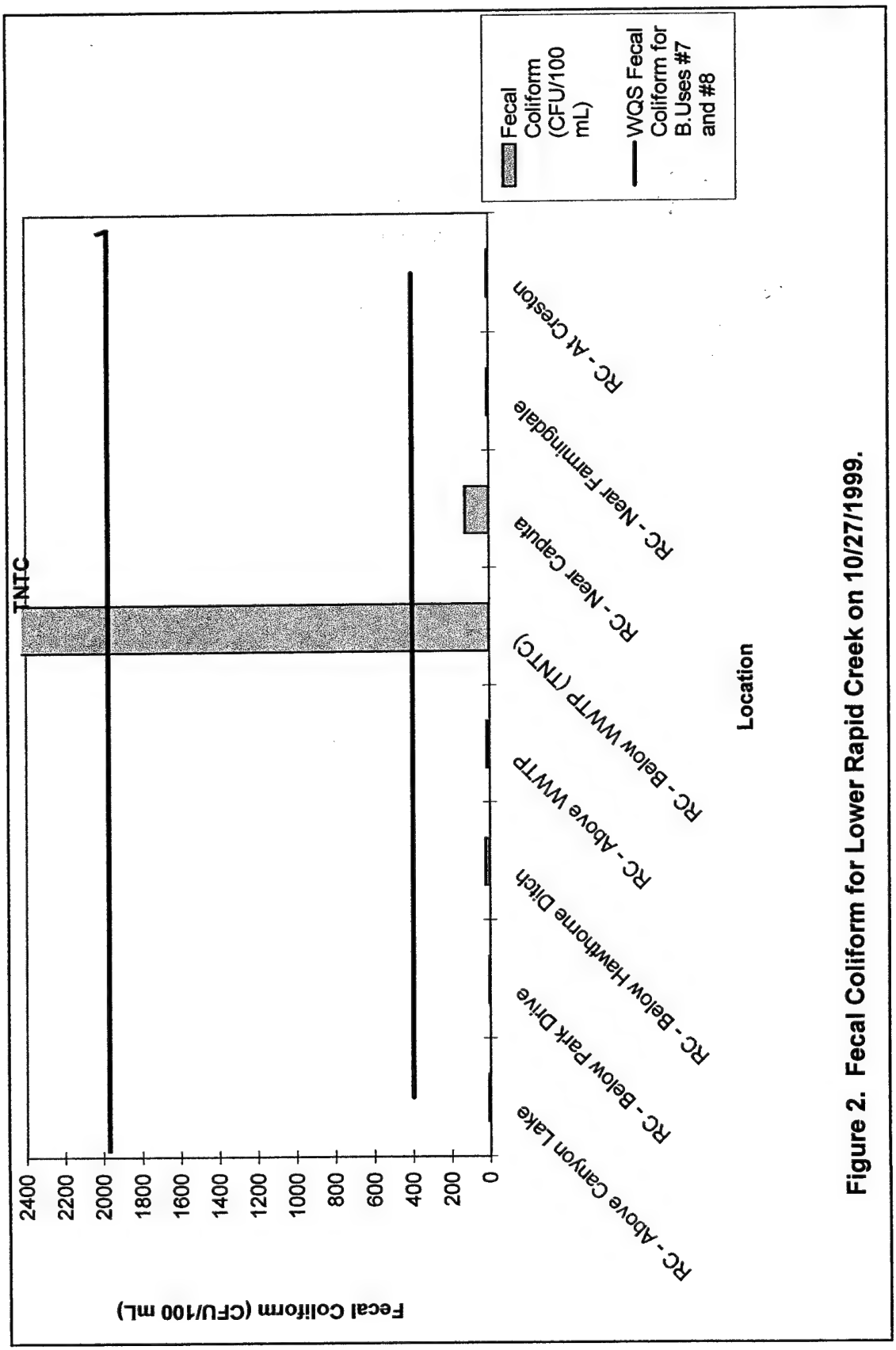

Figure 2. Fecal Coliform for Lower Rapid Creek on 10/27/1999.

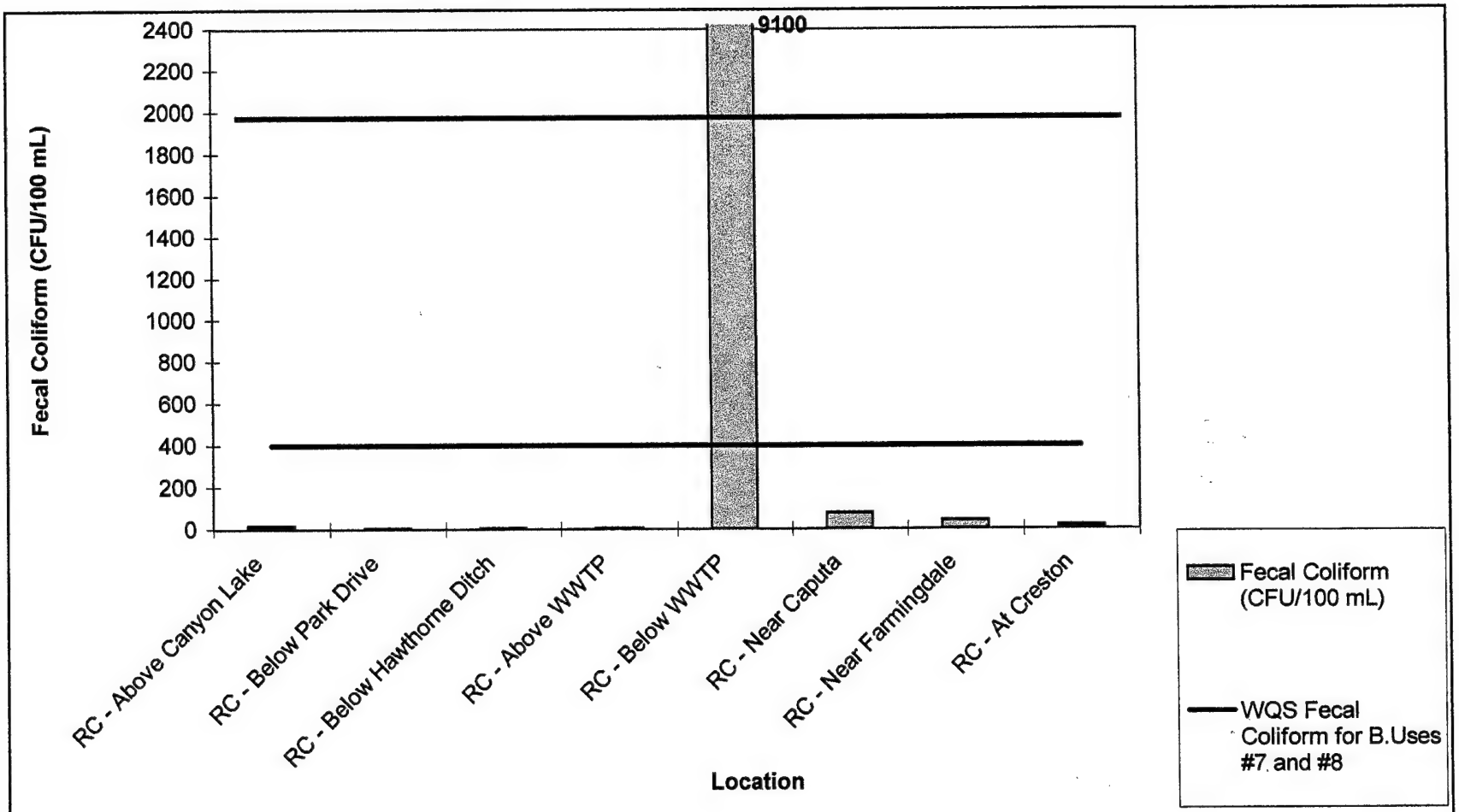

Figure 3. Fecal Coliform for Lower Rapid Creek on 11/17/1999.

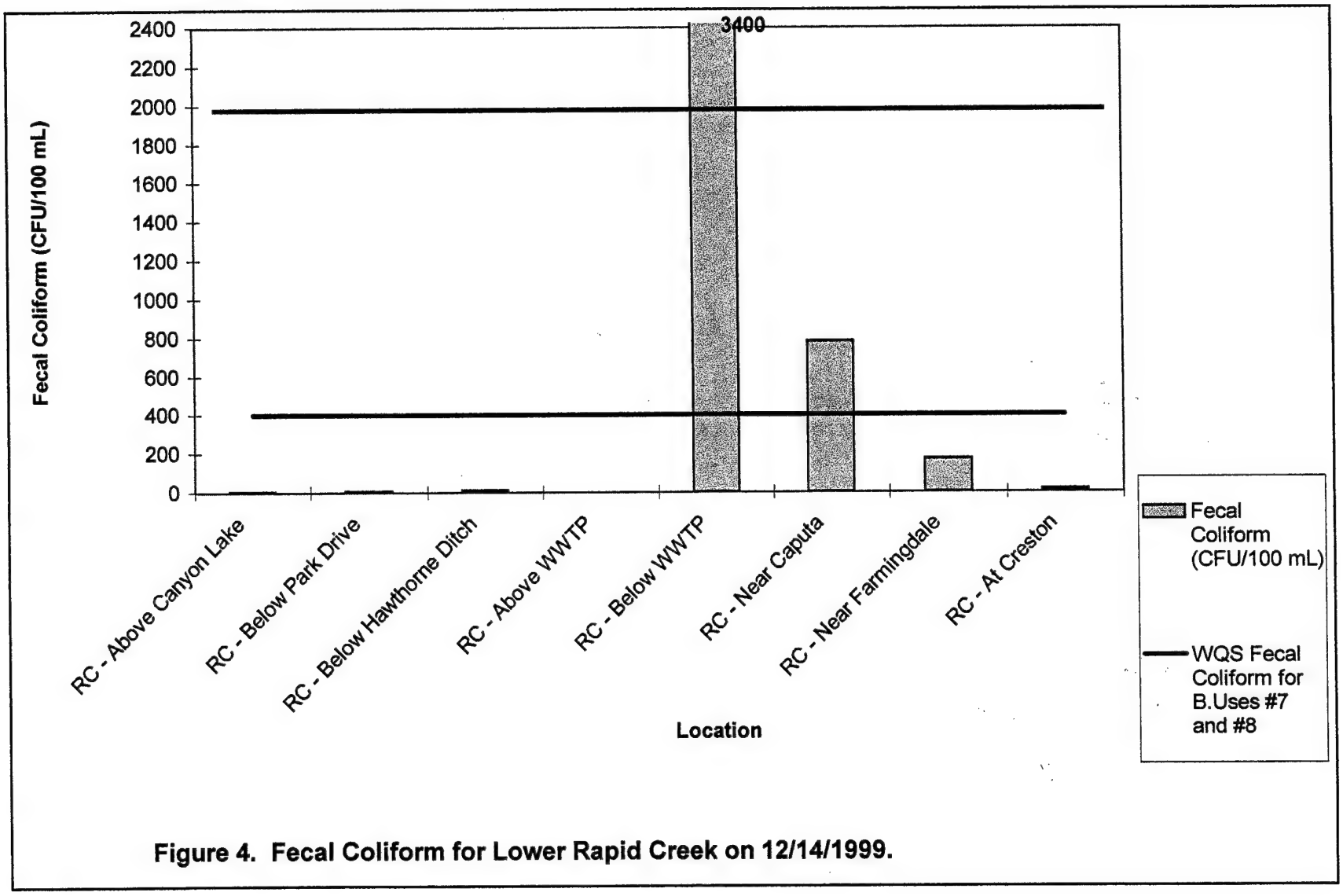

Figure 4. Fecal Coliform for Lower Rapid Creek on 12/14/1999.

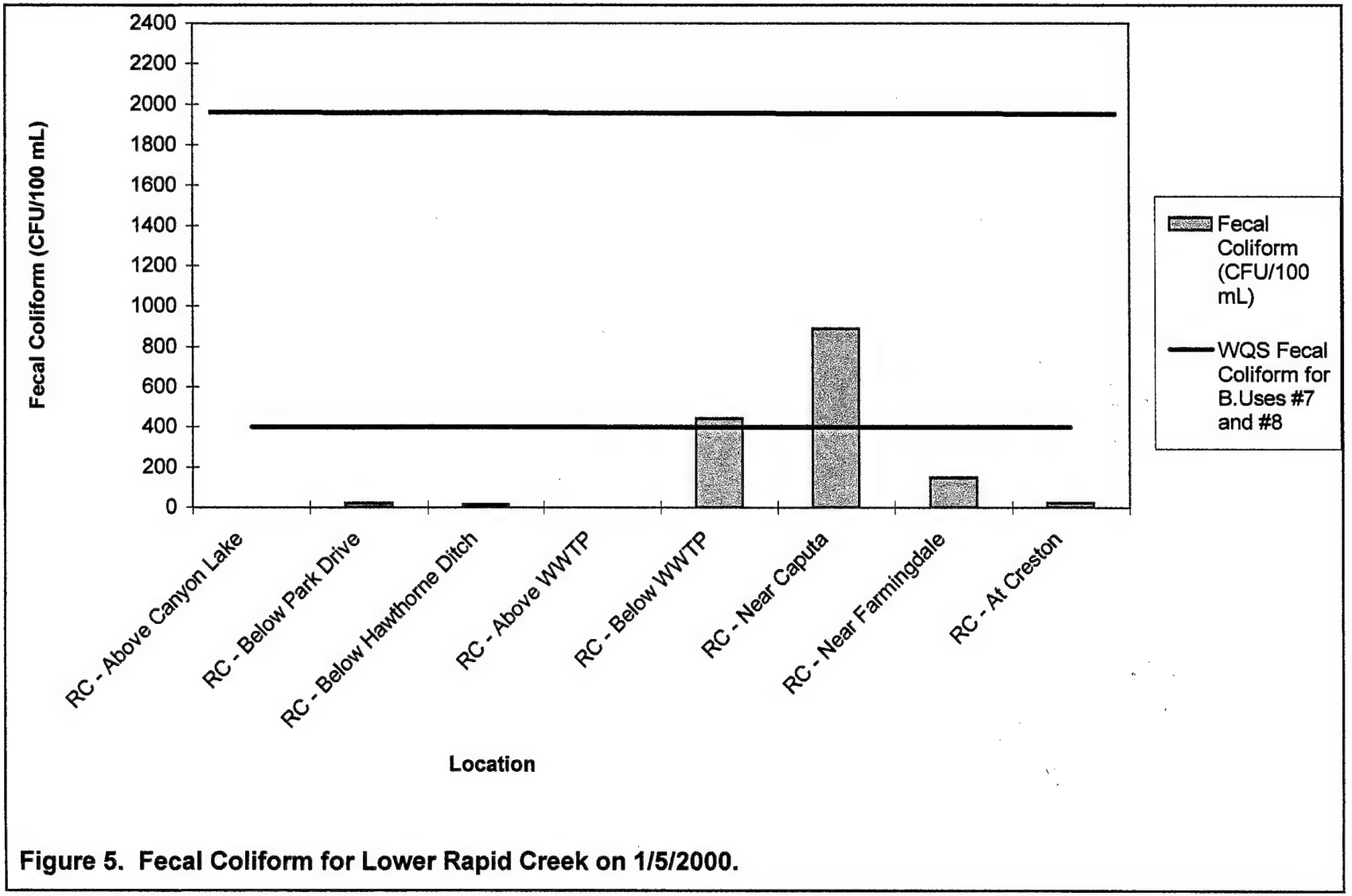

Figure 5. Fecal Coliform for Lower Rapid Creek on 1/5/2000.

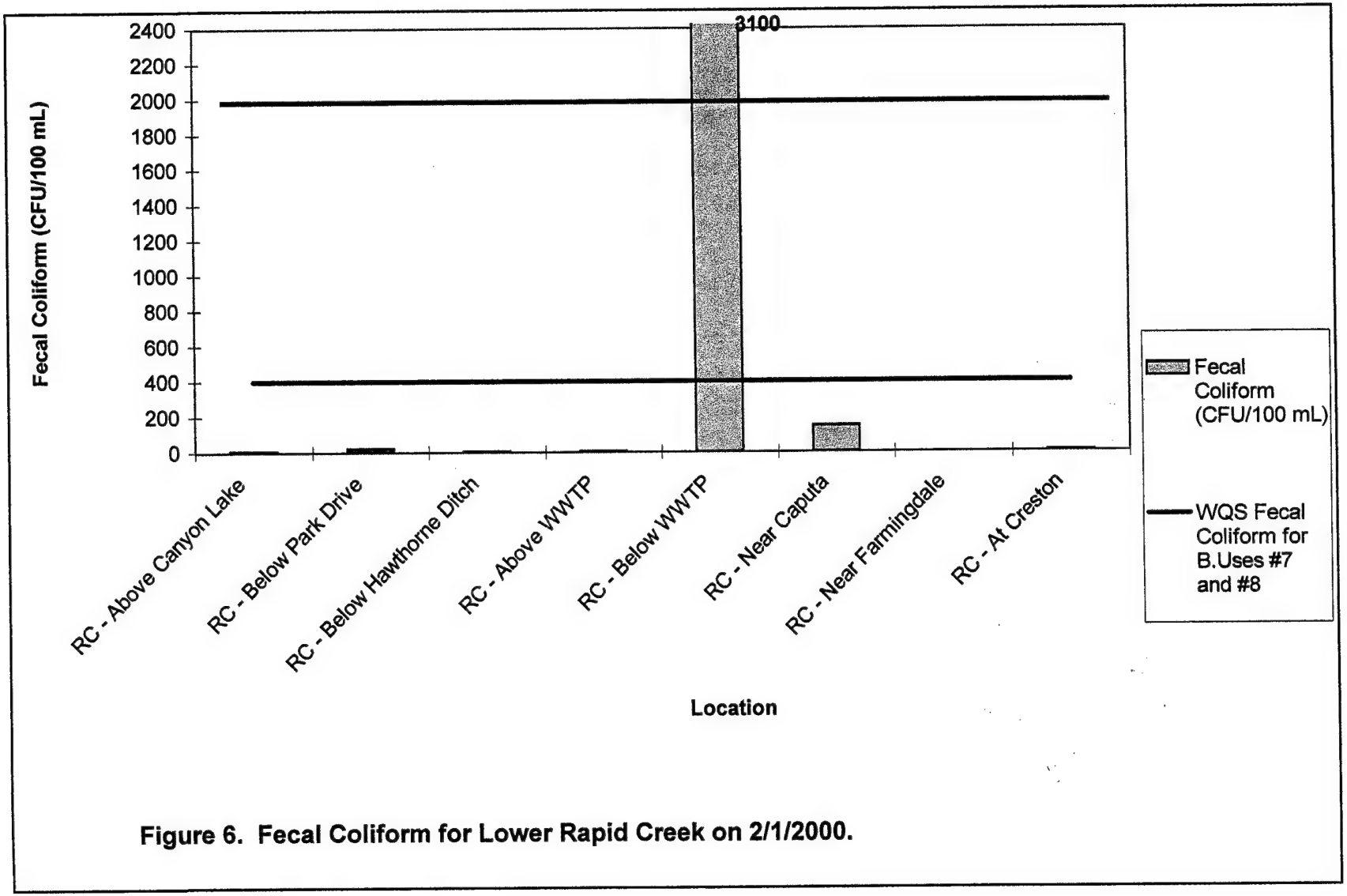

Figure 6. Fecal Coliform for Lower Rapid Creek on 2/1/2000.

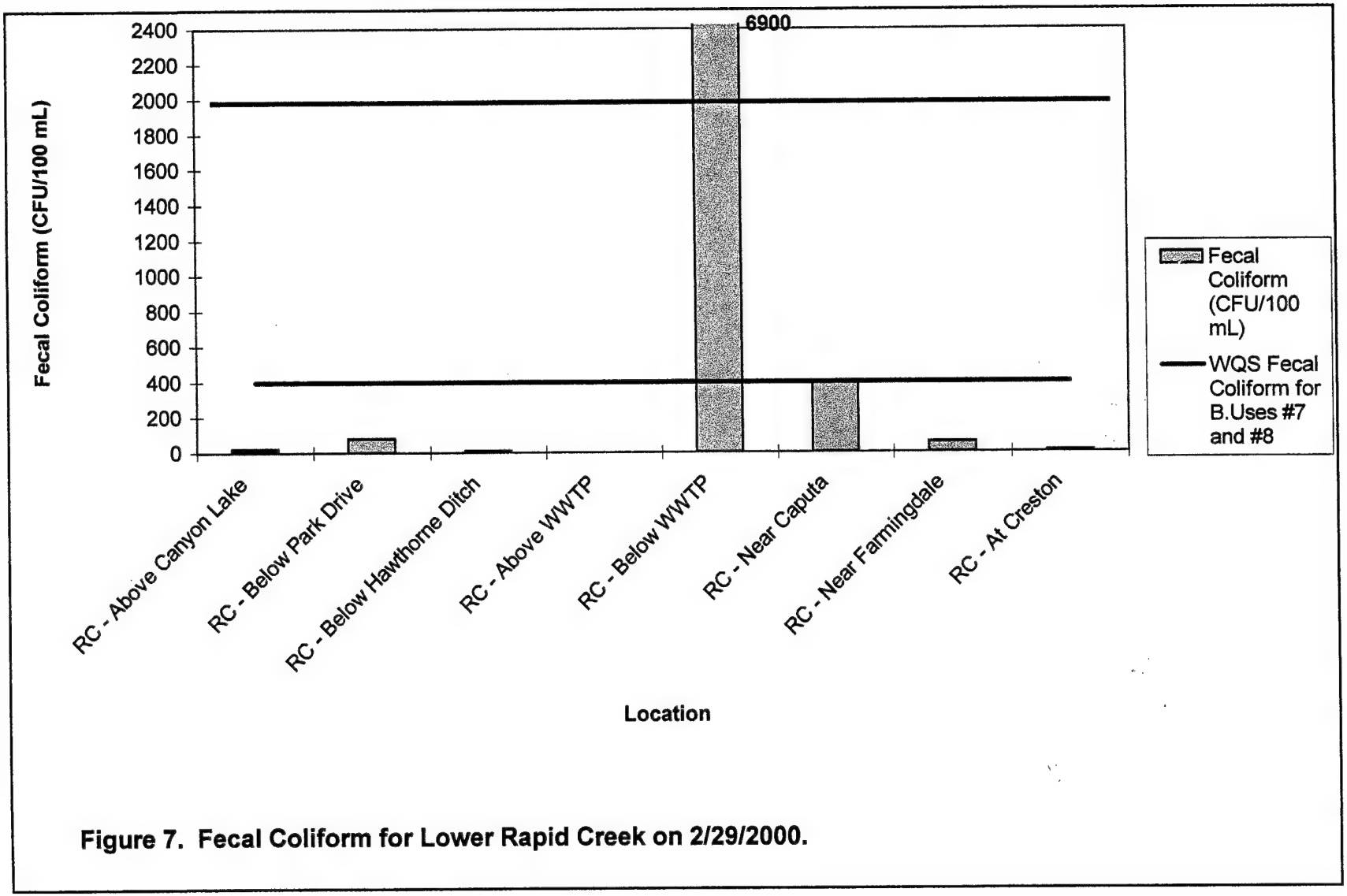

Figure 7. Fecal Coliform for Lower Rapid Creek on 2/29/2000.

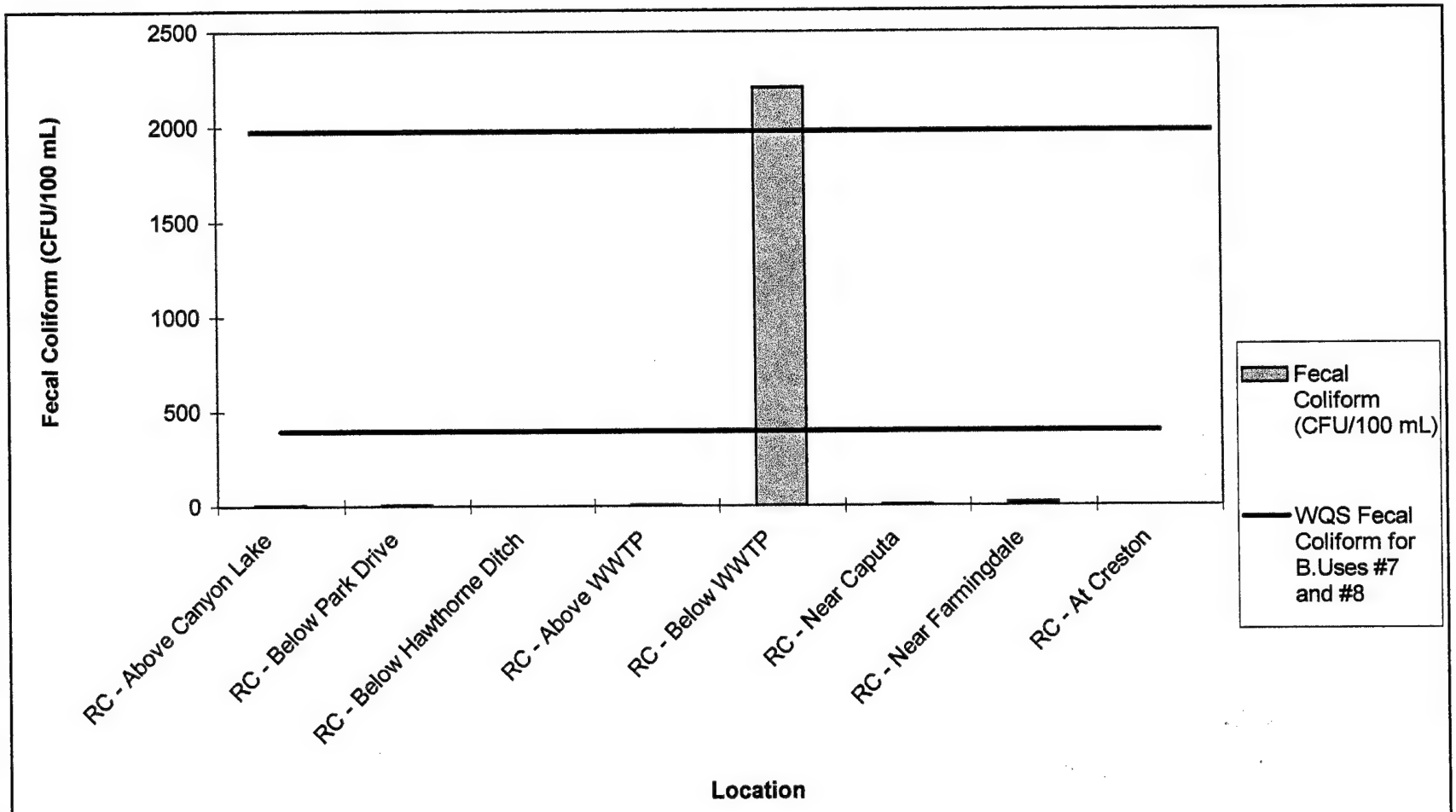

Figure 8. Fecal Coliform for Lower Rapid Creek on 3/28/2000.

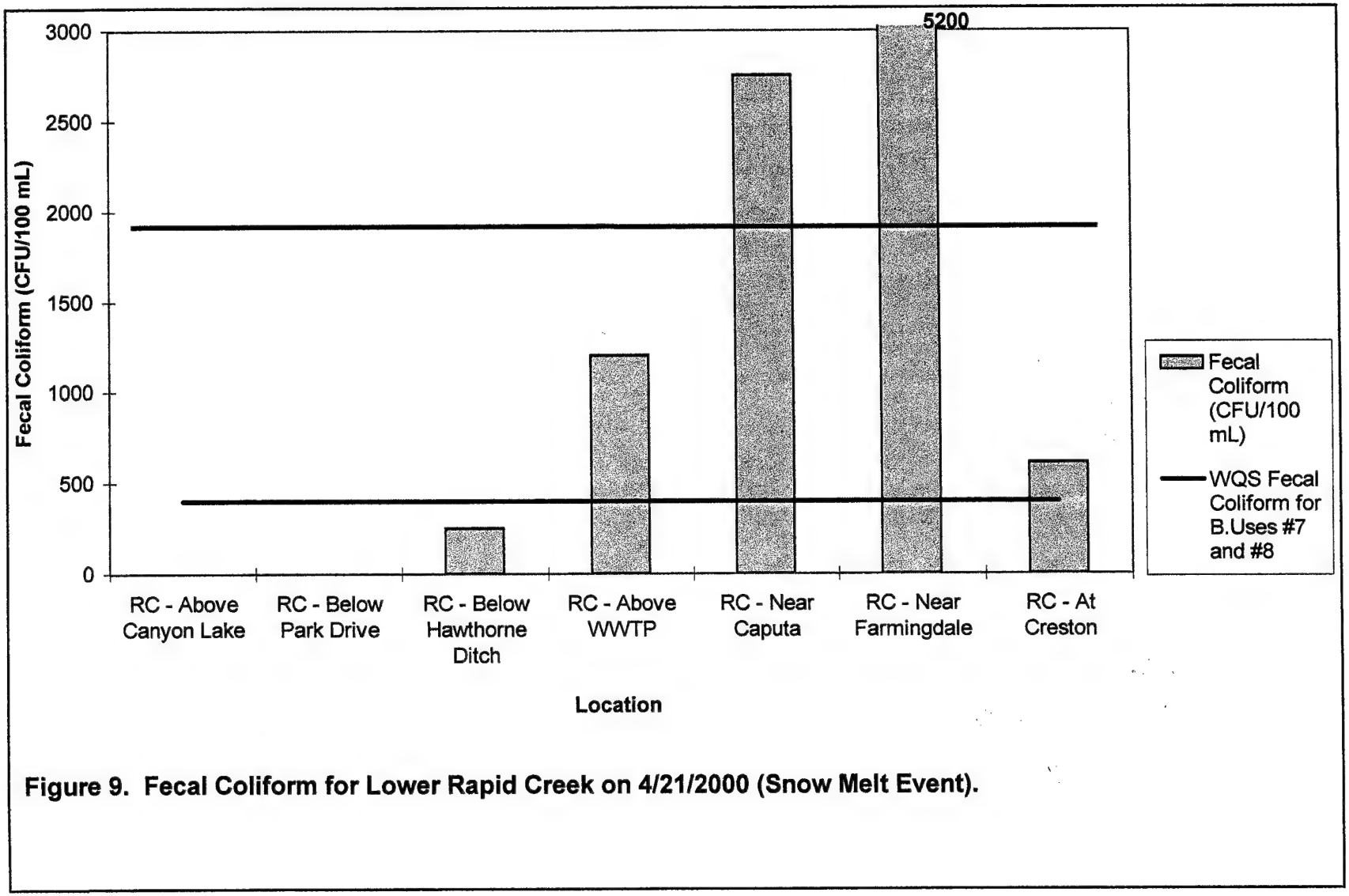

Figure 9. Fecal Coliform for Lower Rapid Creek on 4/21/2000 (Snow Melt Event).

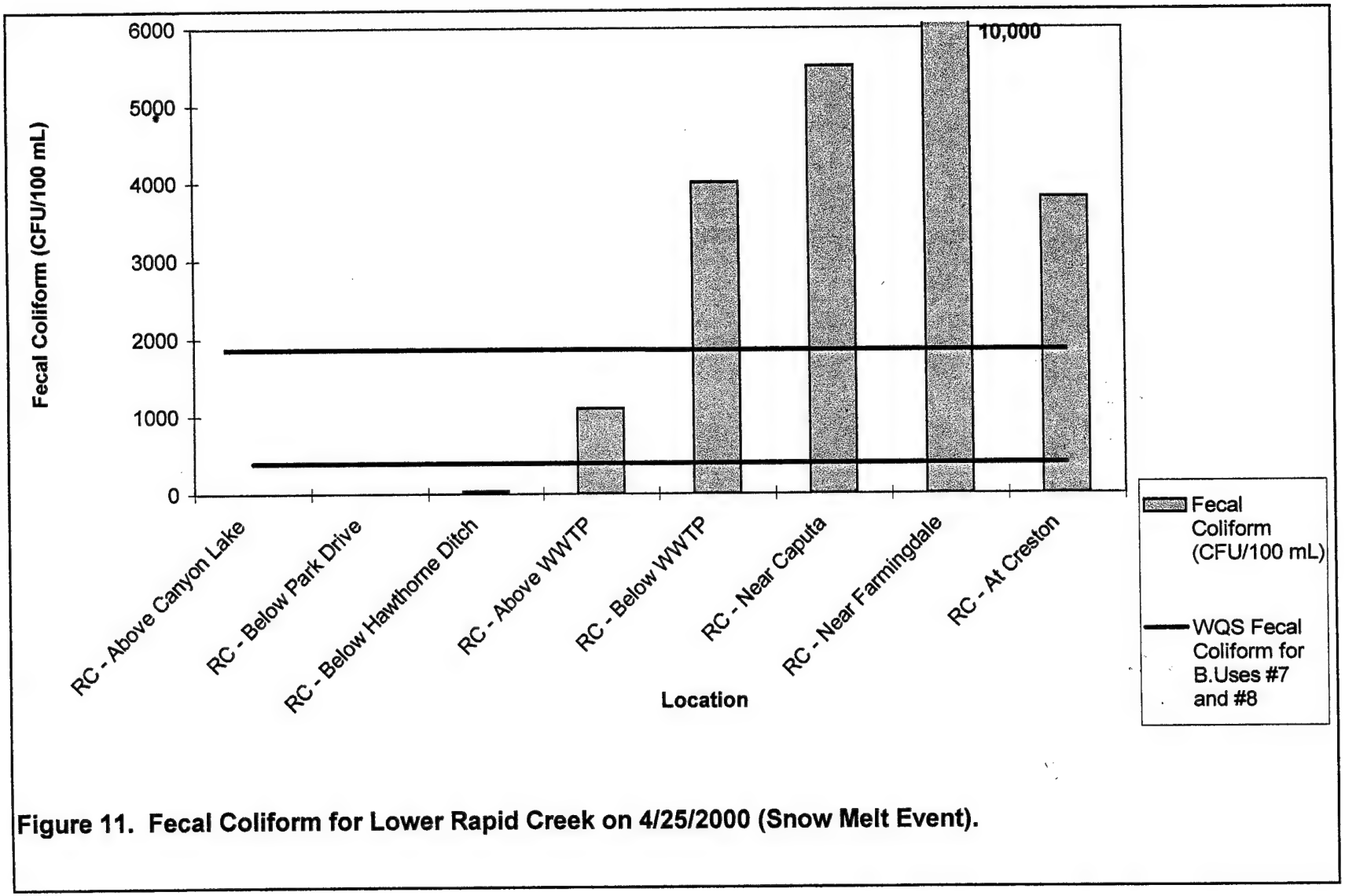

Figure 11. Fecal Coliform for Lower Rapid Creek on 4/25/2000 (Snow Melt Event).

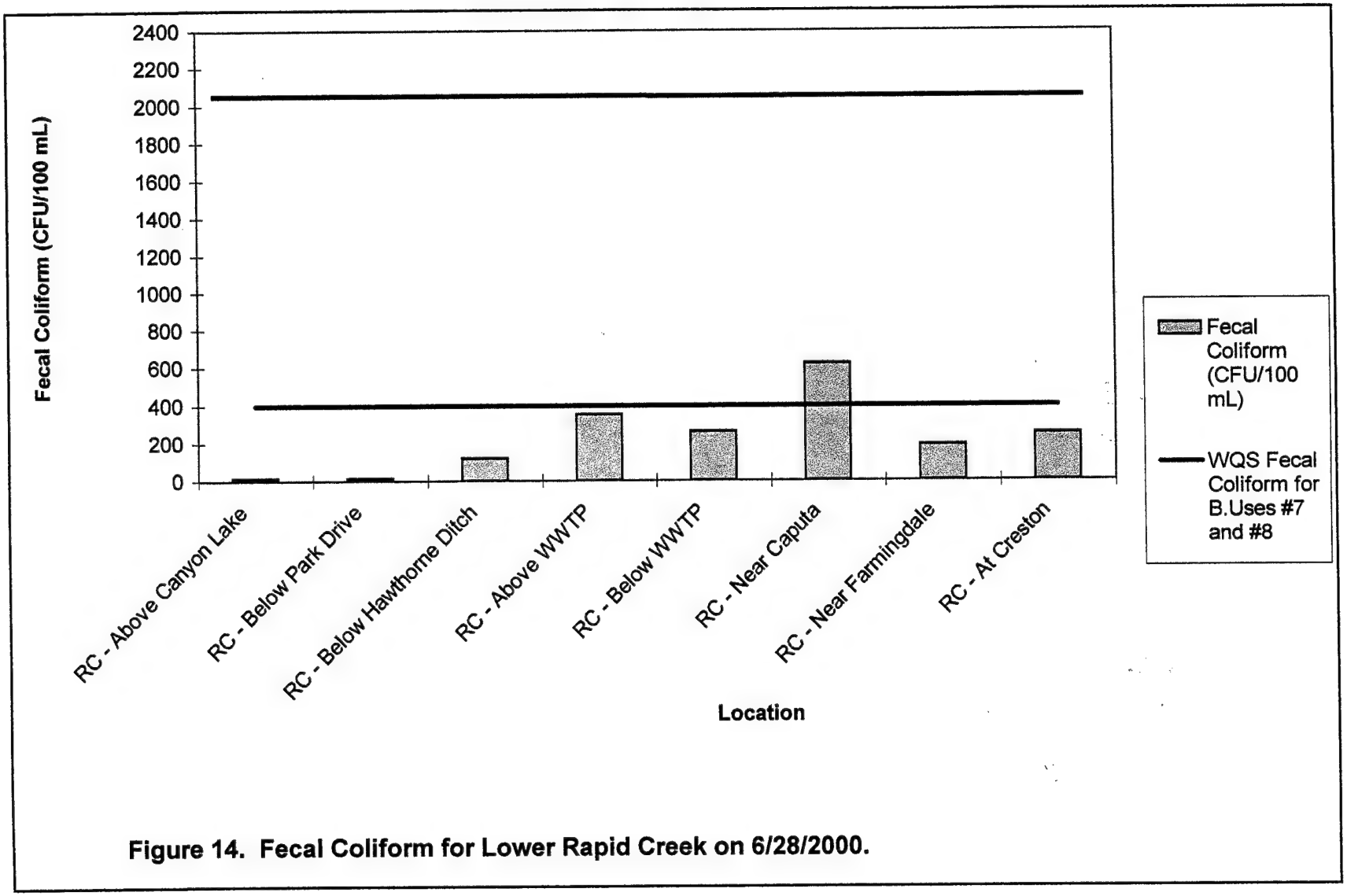

Figure 14. Fecal Coliform for Lower Rapid Creek on 6/28/2000.

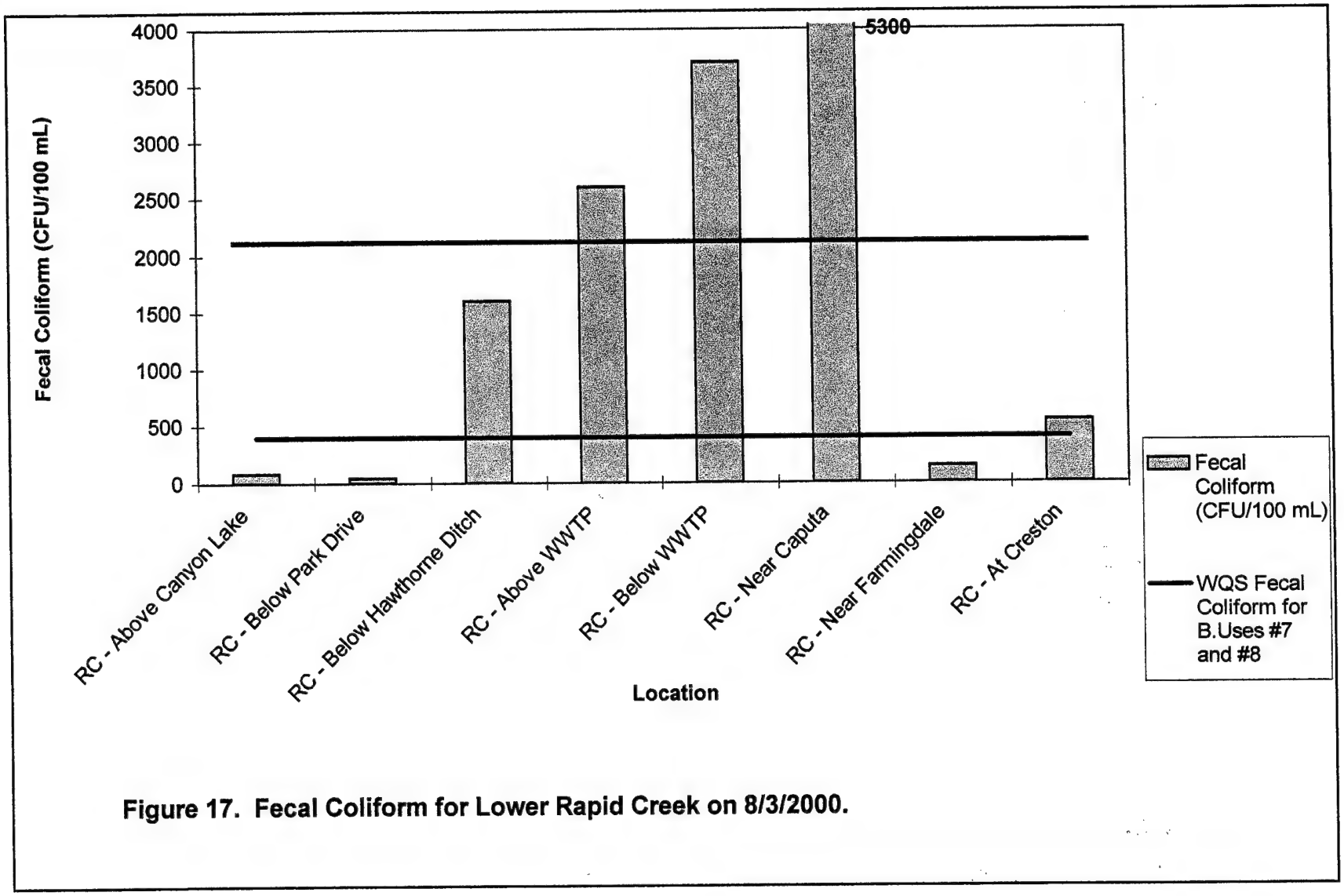

Figure 17. Fecal Coliform for Lower Rapid Creek on 8/3/2000.

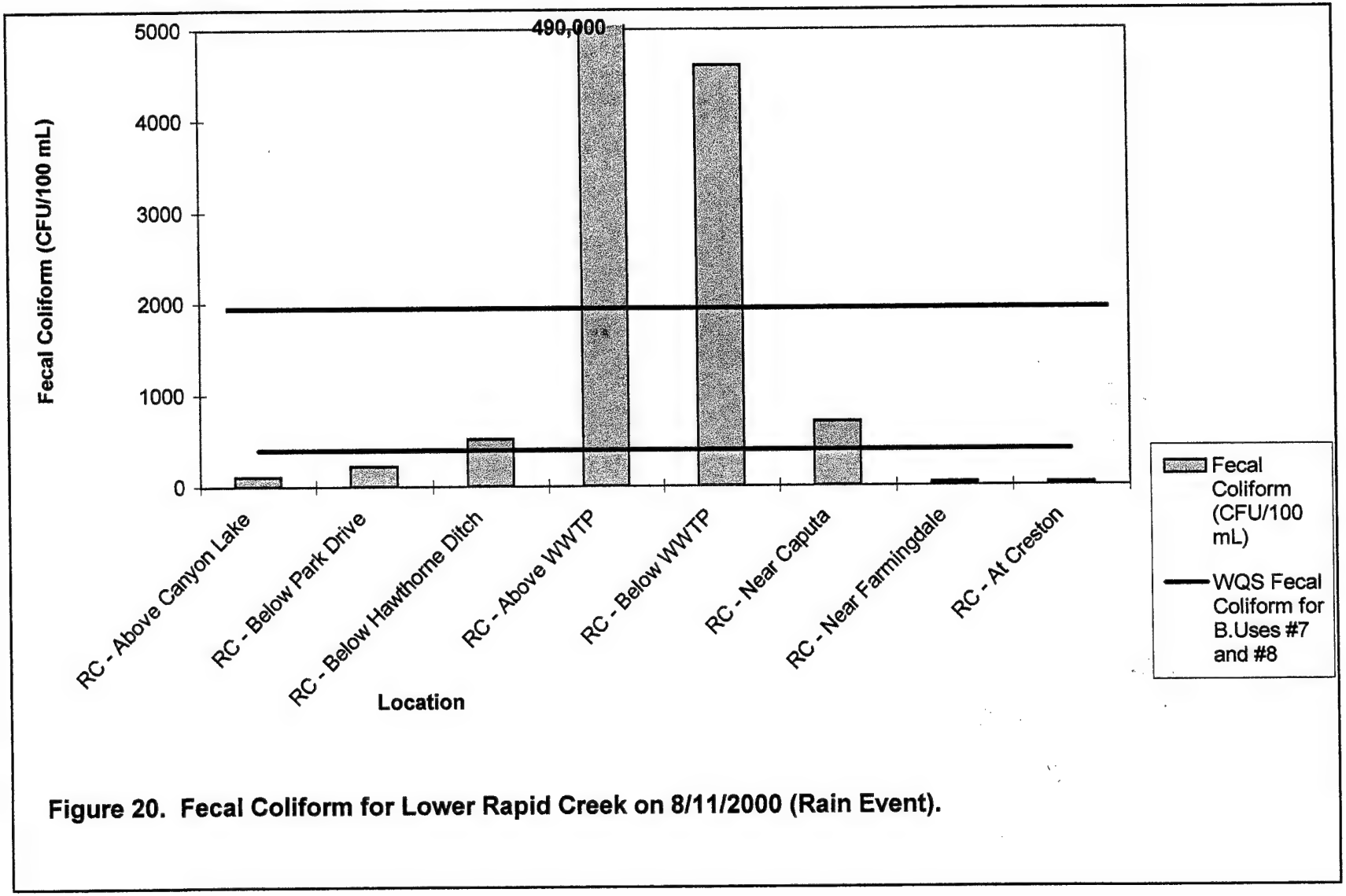

Figure 20. Fecal Coliform for Lower Rapid Creek on 8/11/2000 (Rain Event).

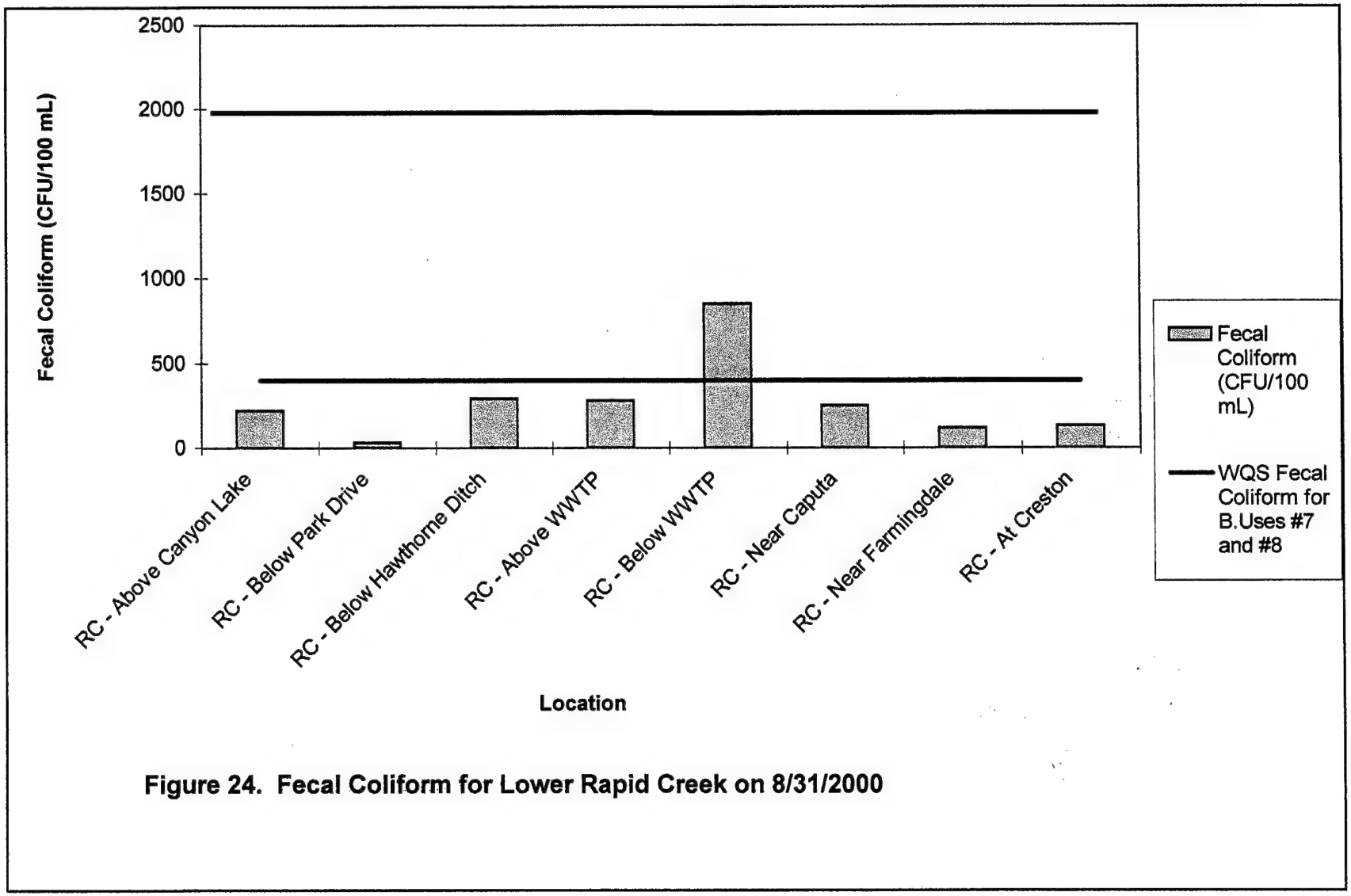

Figure 24. Fecal Coliform for Lower Rapid Creek on 8/31/2000

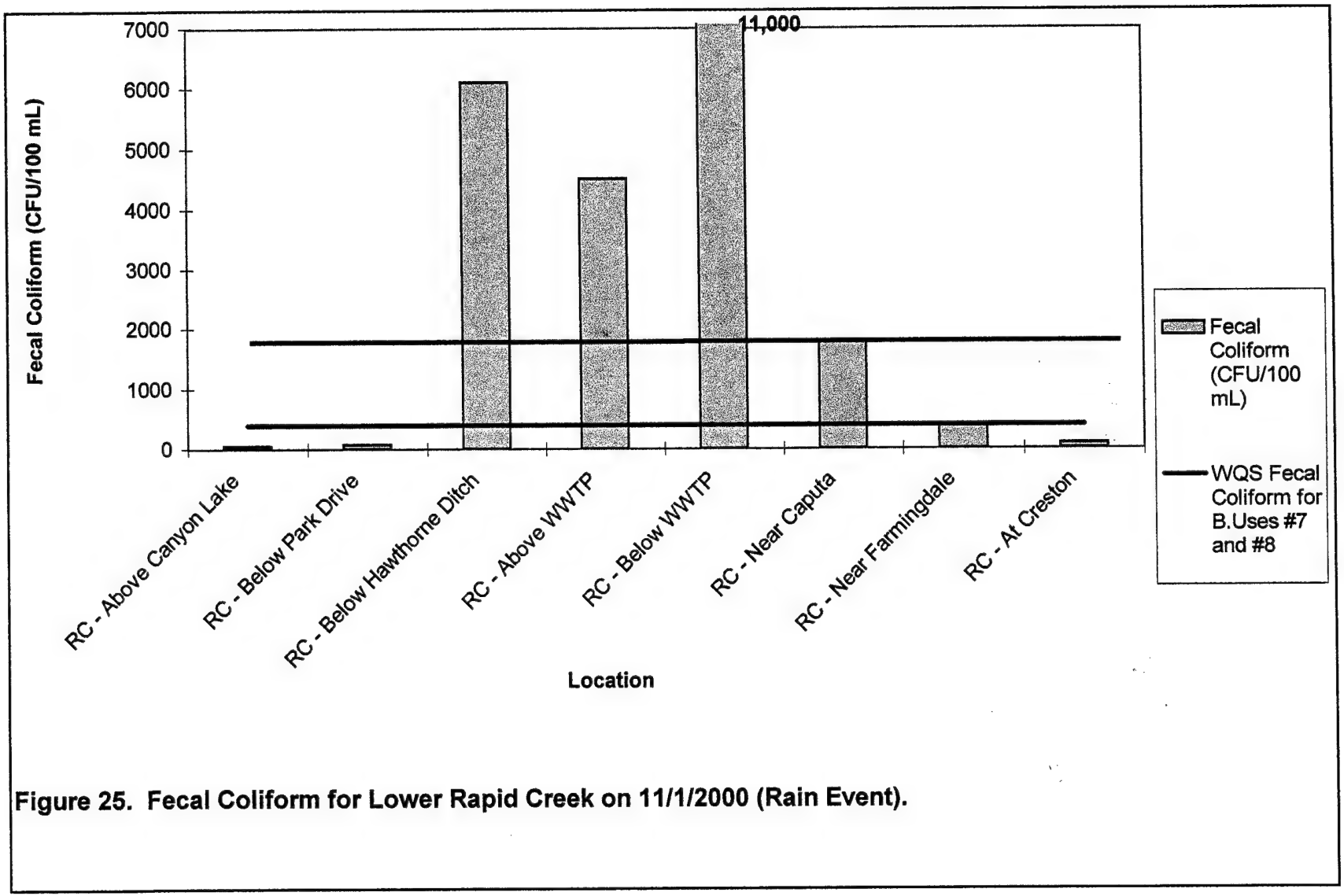

Figure 25. Fecal Coliform for Lower Rapid Creek on 11/1/2000 (Rain Event).

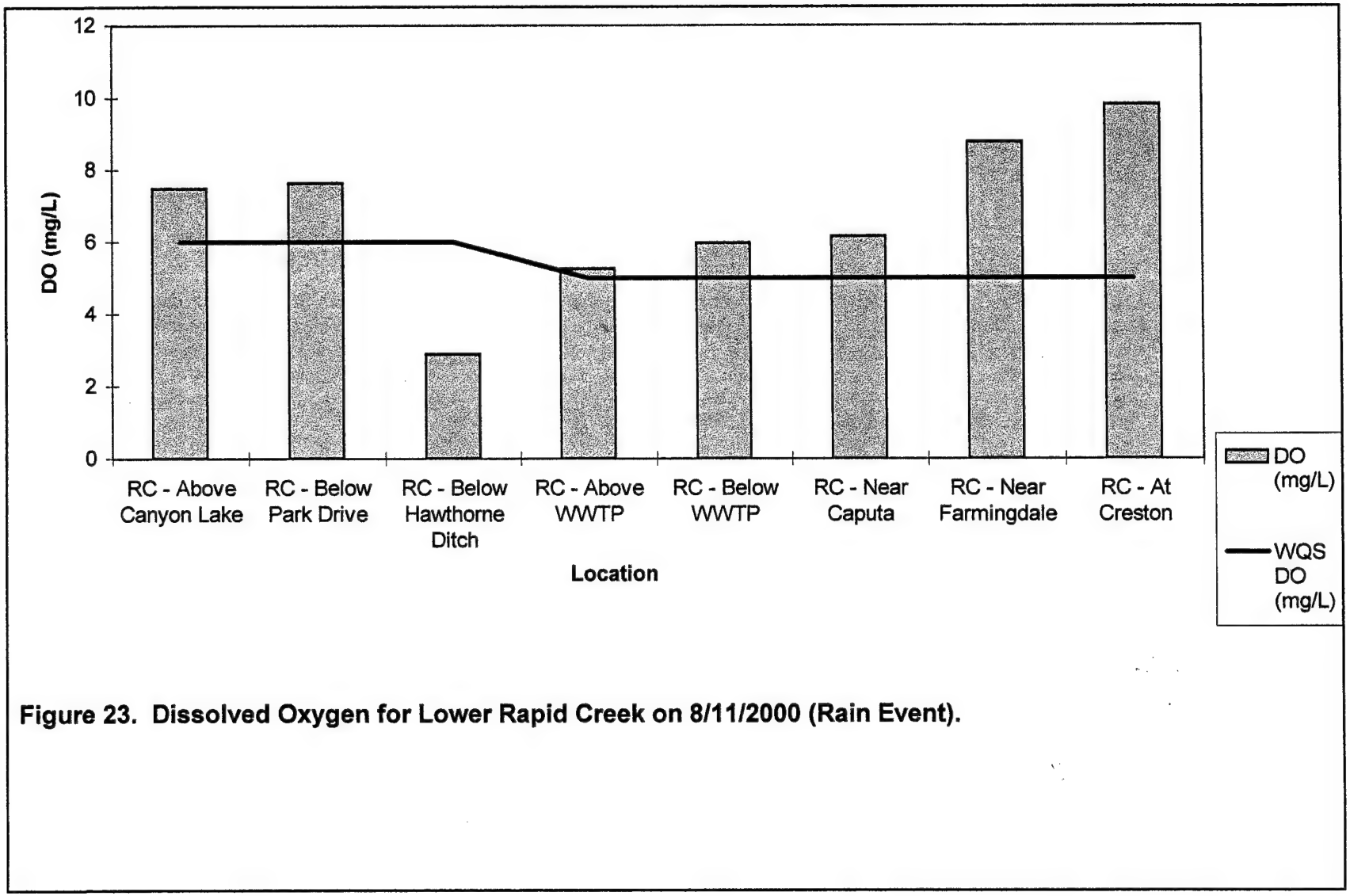

Figure 23. Dissolved Oxygen for Lower Rapid Creek on 8/11/2000 (Rain Event).

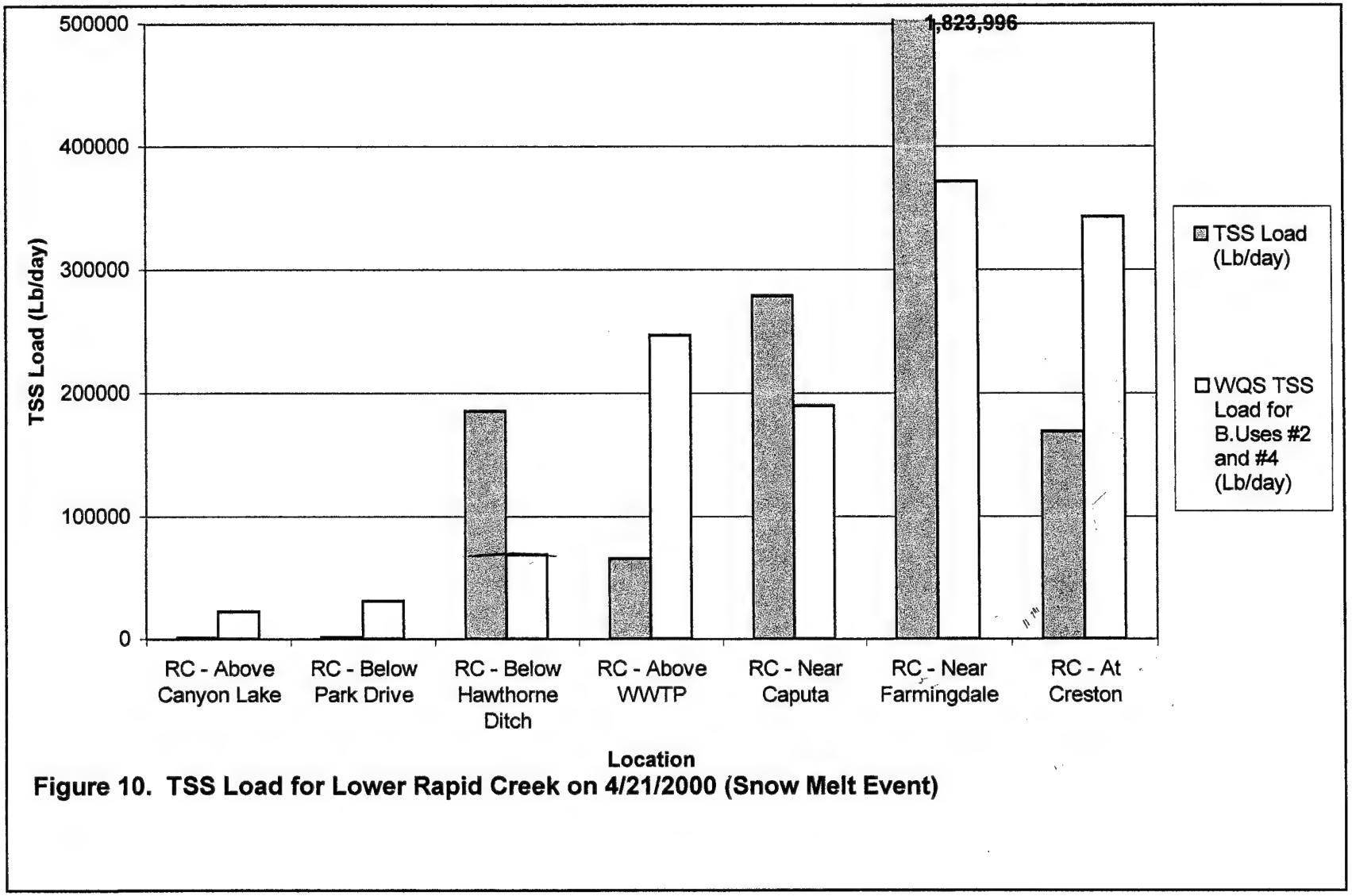

Figure 10. TSS Load for Lower Rapid Creek on 4/21/2000 (Snow Melt Event)

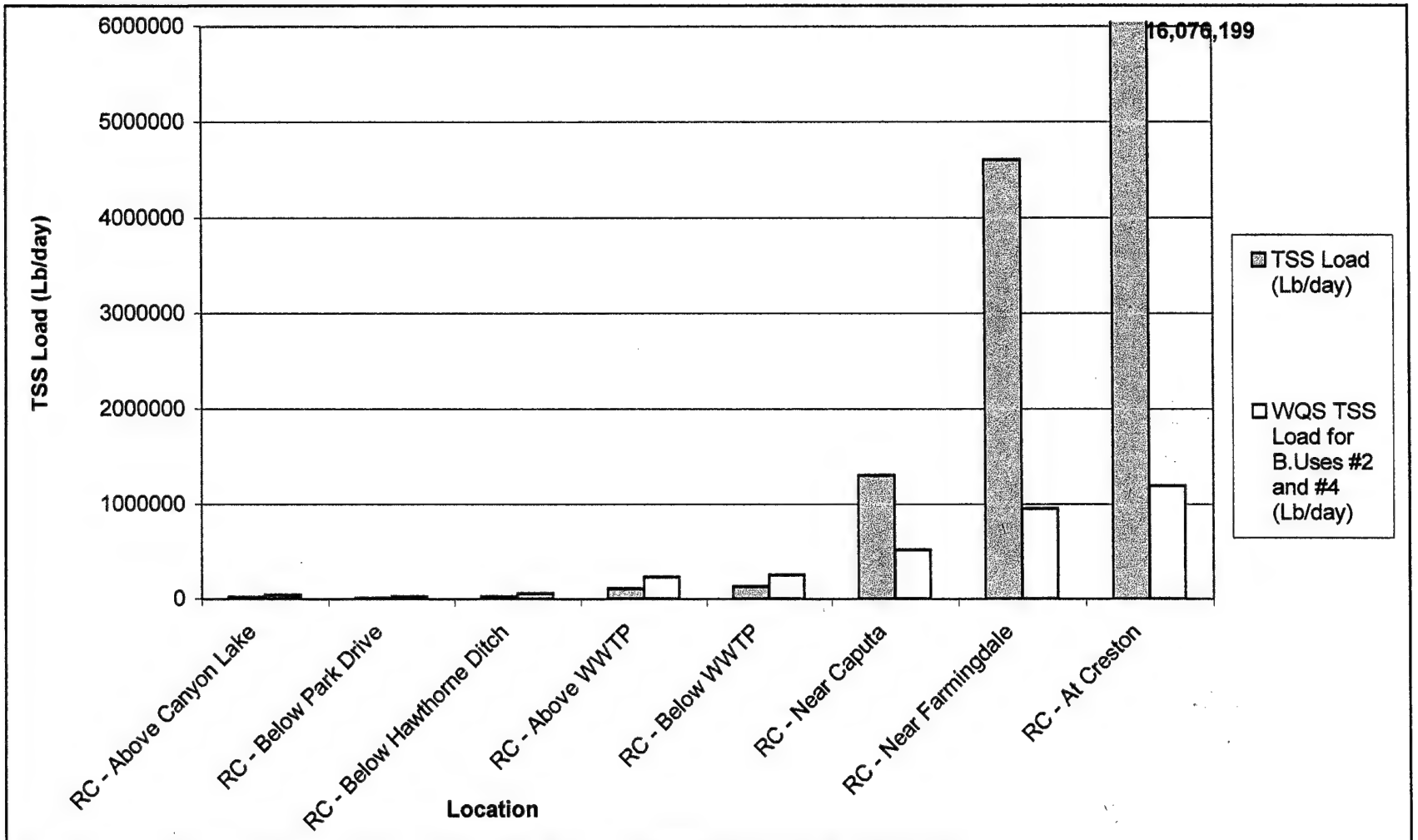

Figure 12. TSS Load for Lower Rapid Creek on 4/25/2000 (Snow Melt Event)

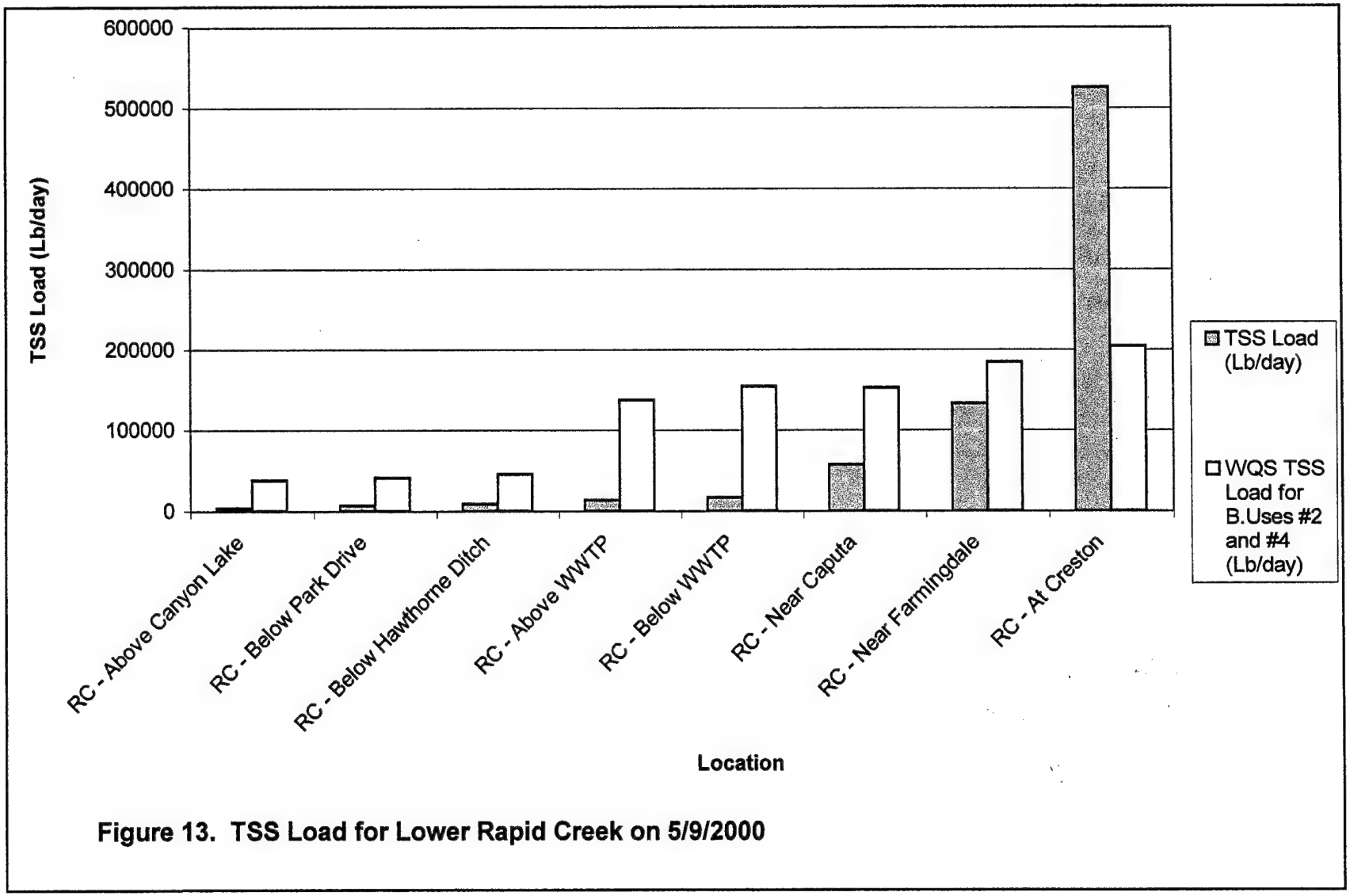

Figure 13. TSS Load for Lower Rapid Creek on 5/9/2000

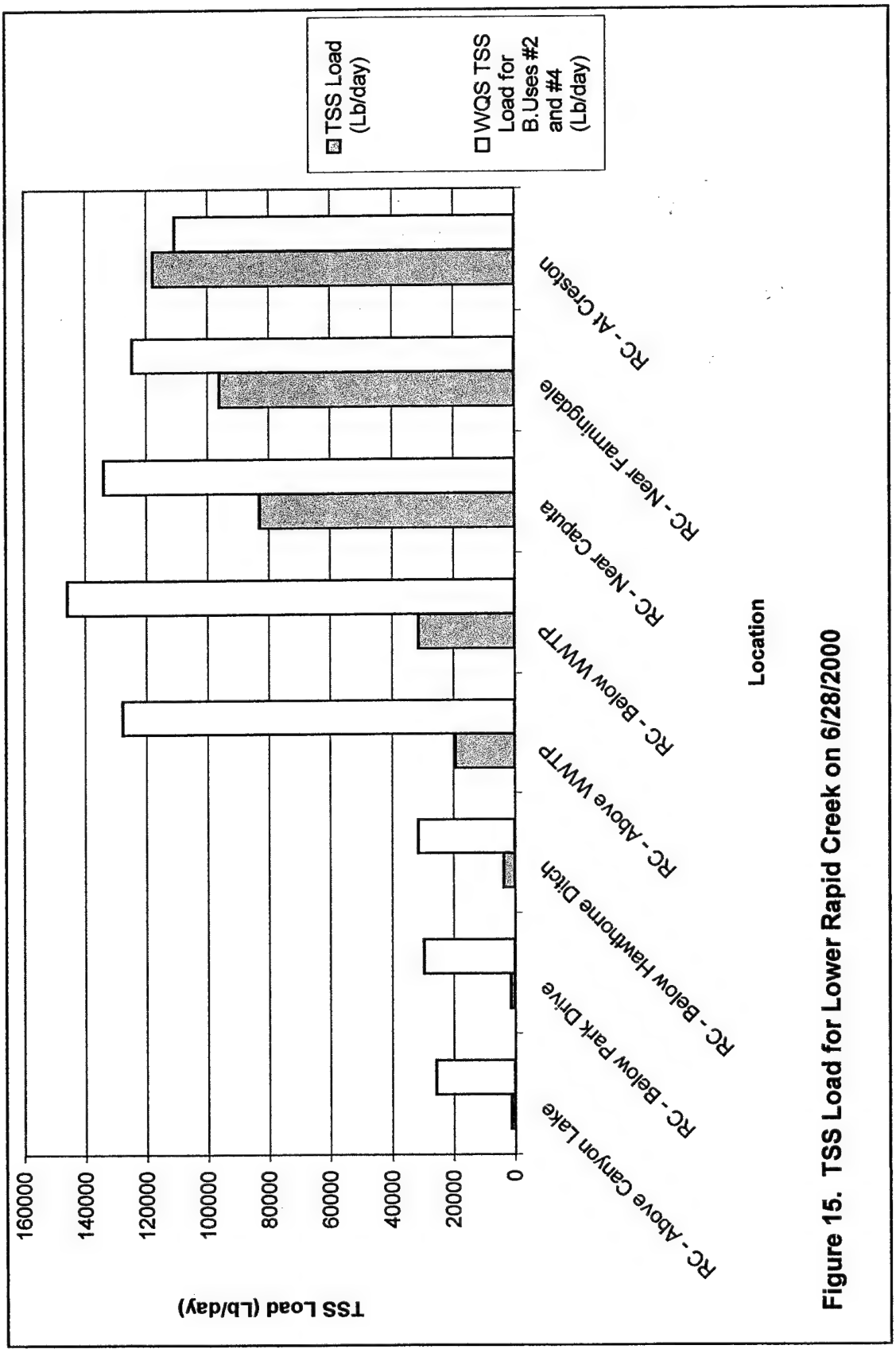

Figure 15. TSS Load for Lower Rapid Creek on 6/28/2000

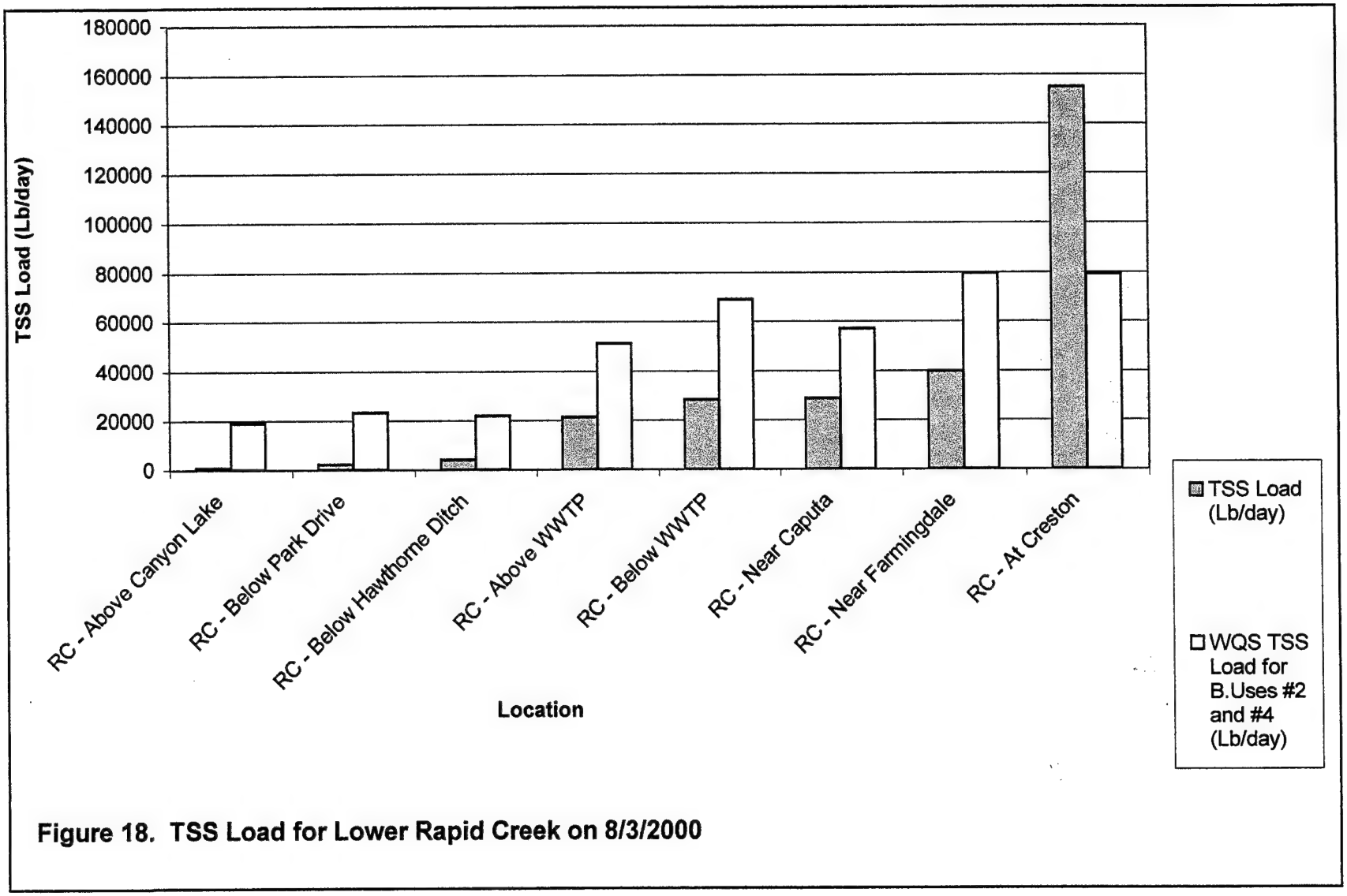

Figure 18. TSS Load for Lower Rapid Creek on 8/3/2000

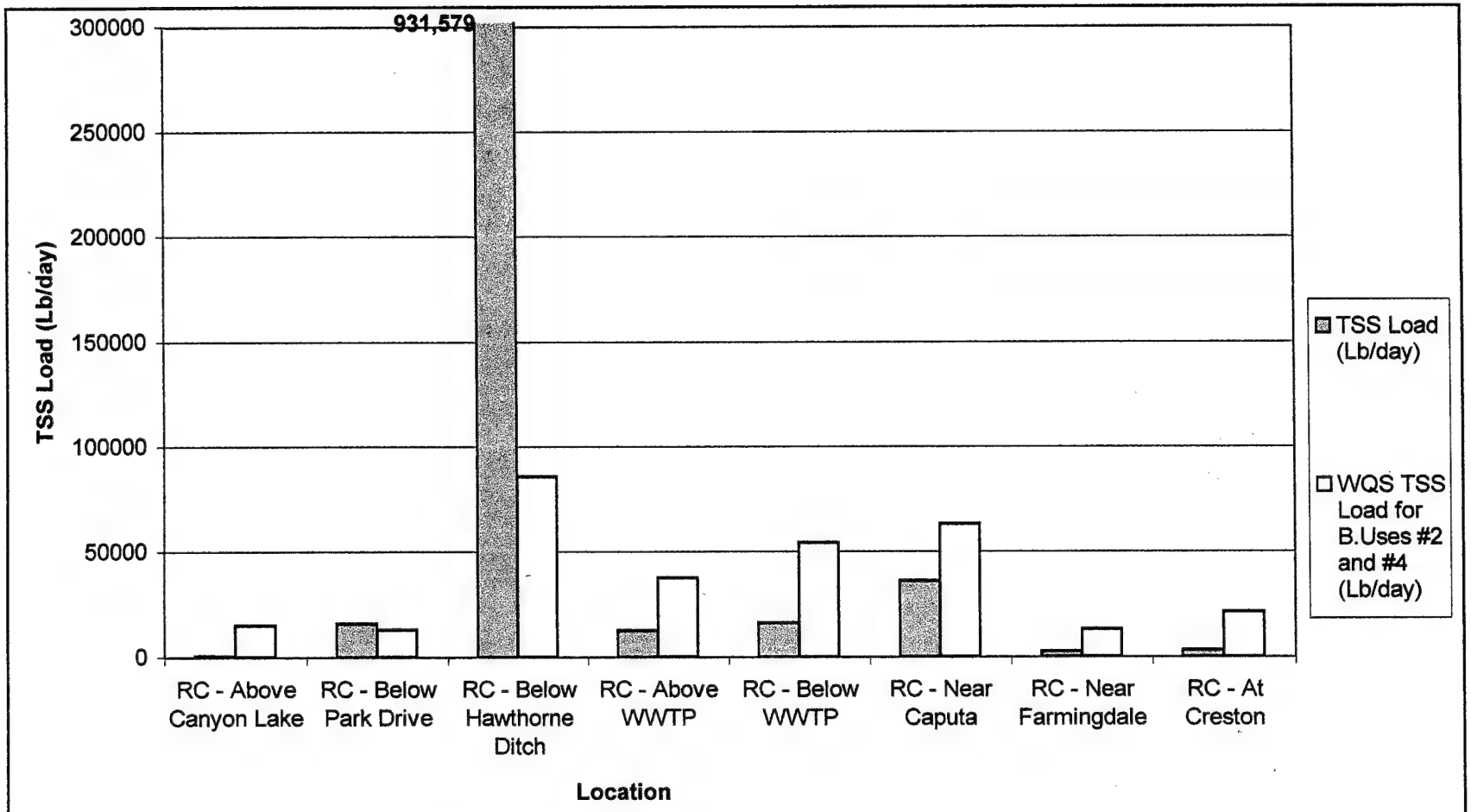

Figure 21. TSS Load for Lower Rapid Creek on 8/11/2000 (Rain Event)

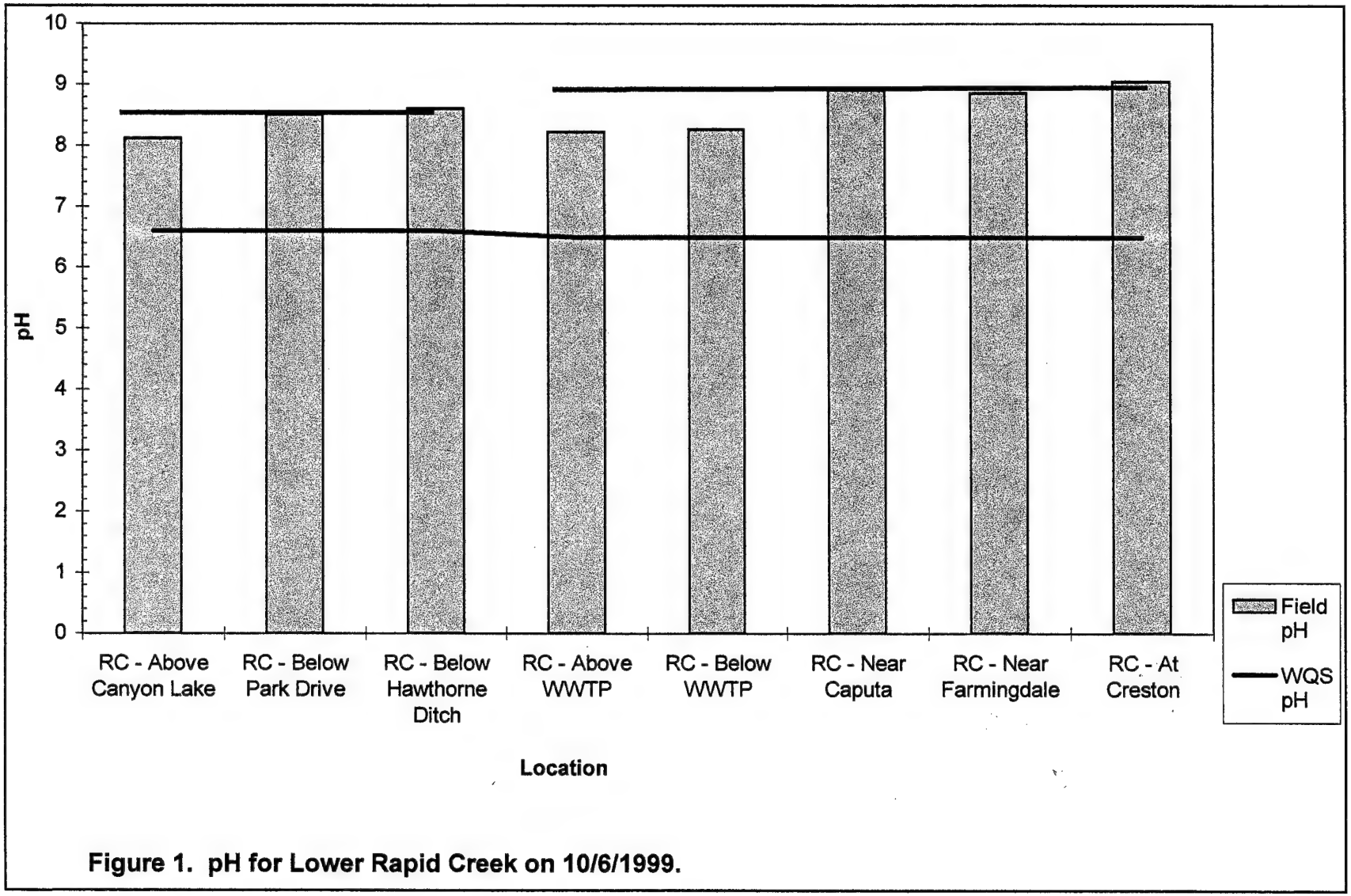

Figure 1. pH for Lower Rapid Creek on 10/6/1999.

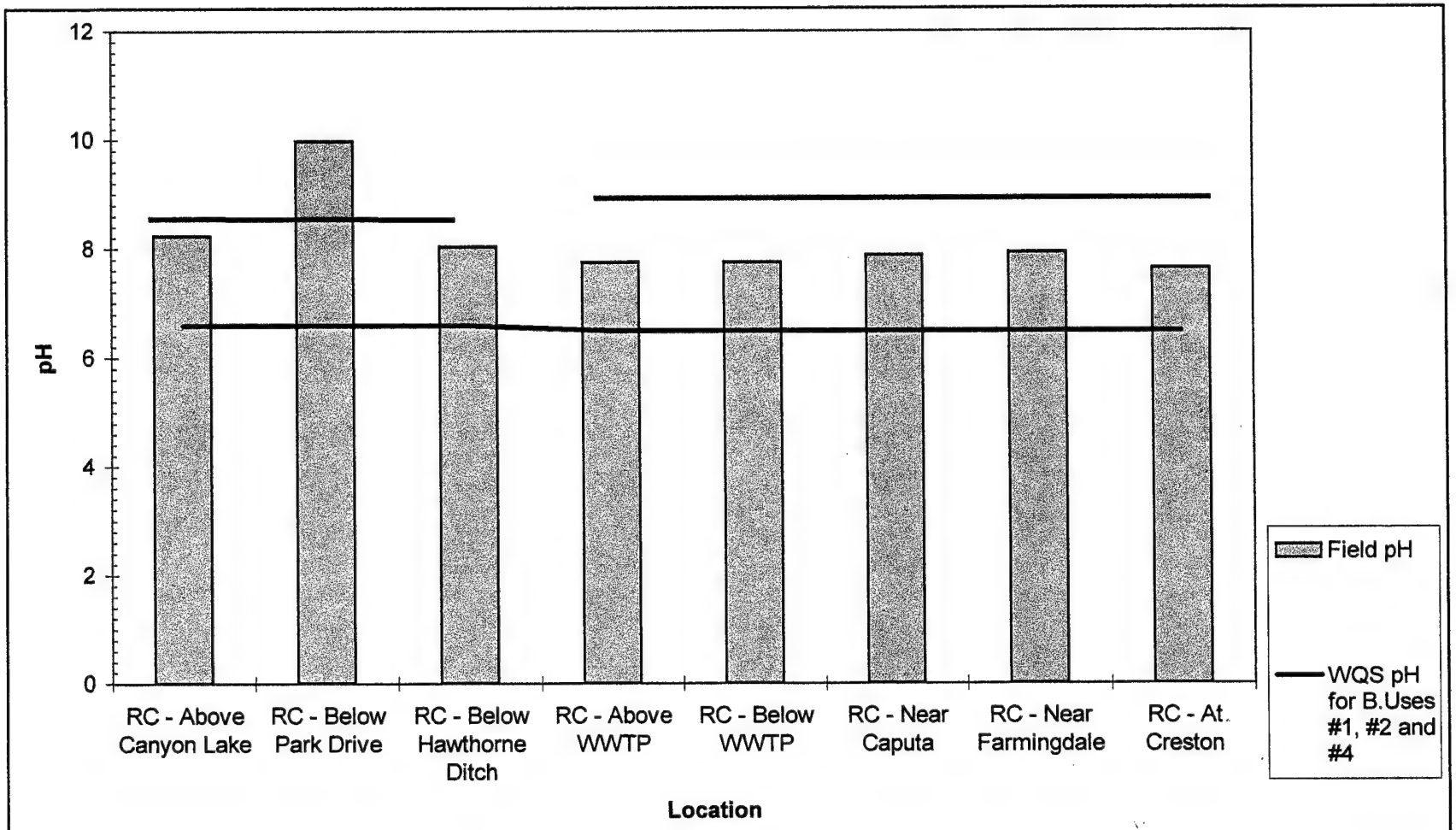

Figure 16. pH for Lower Rapid Creek on 6/28/2000.

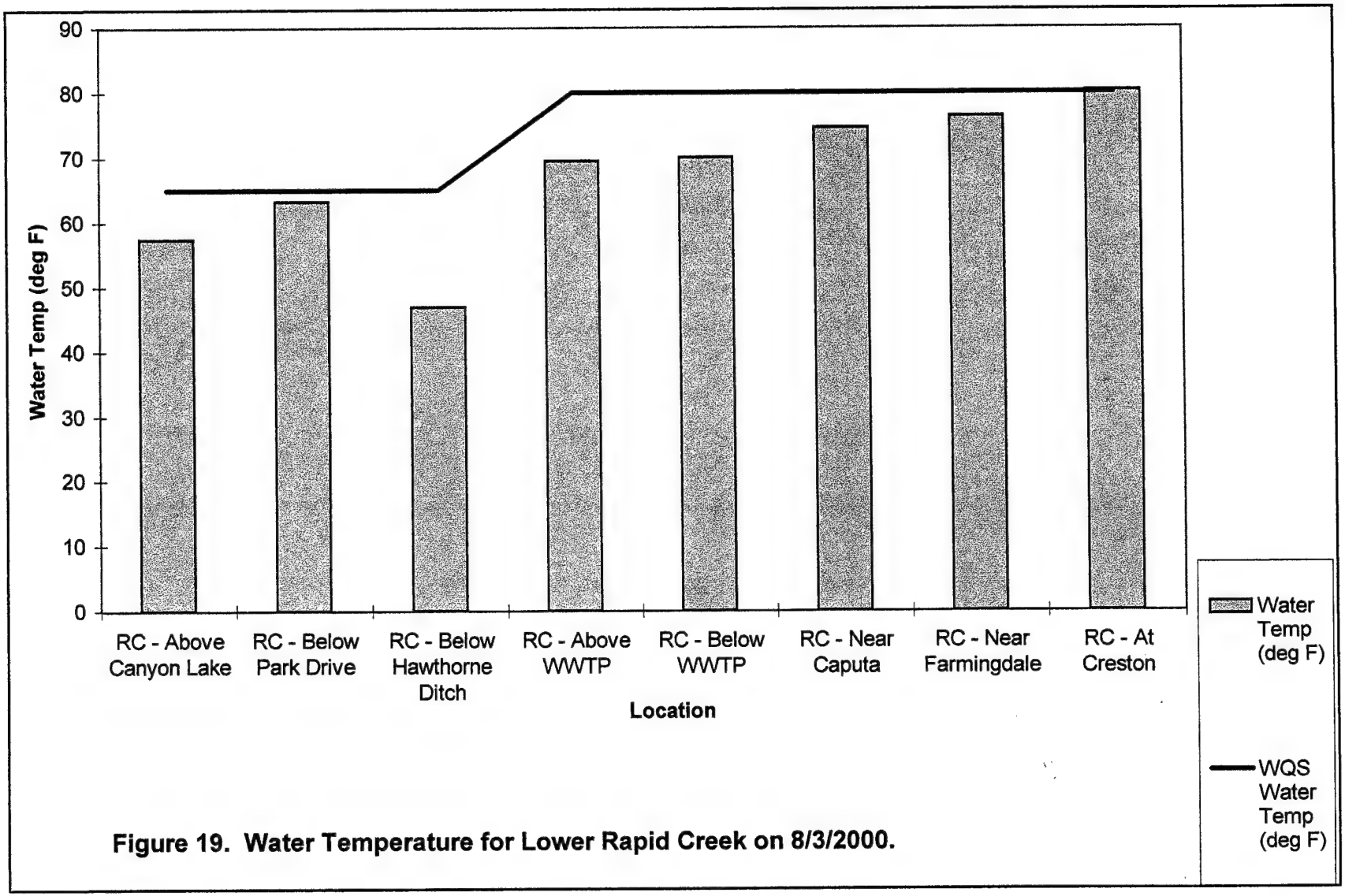

Figure 19. Water Temperature for Lower Rapid Creek on 8/3/2000.

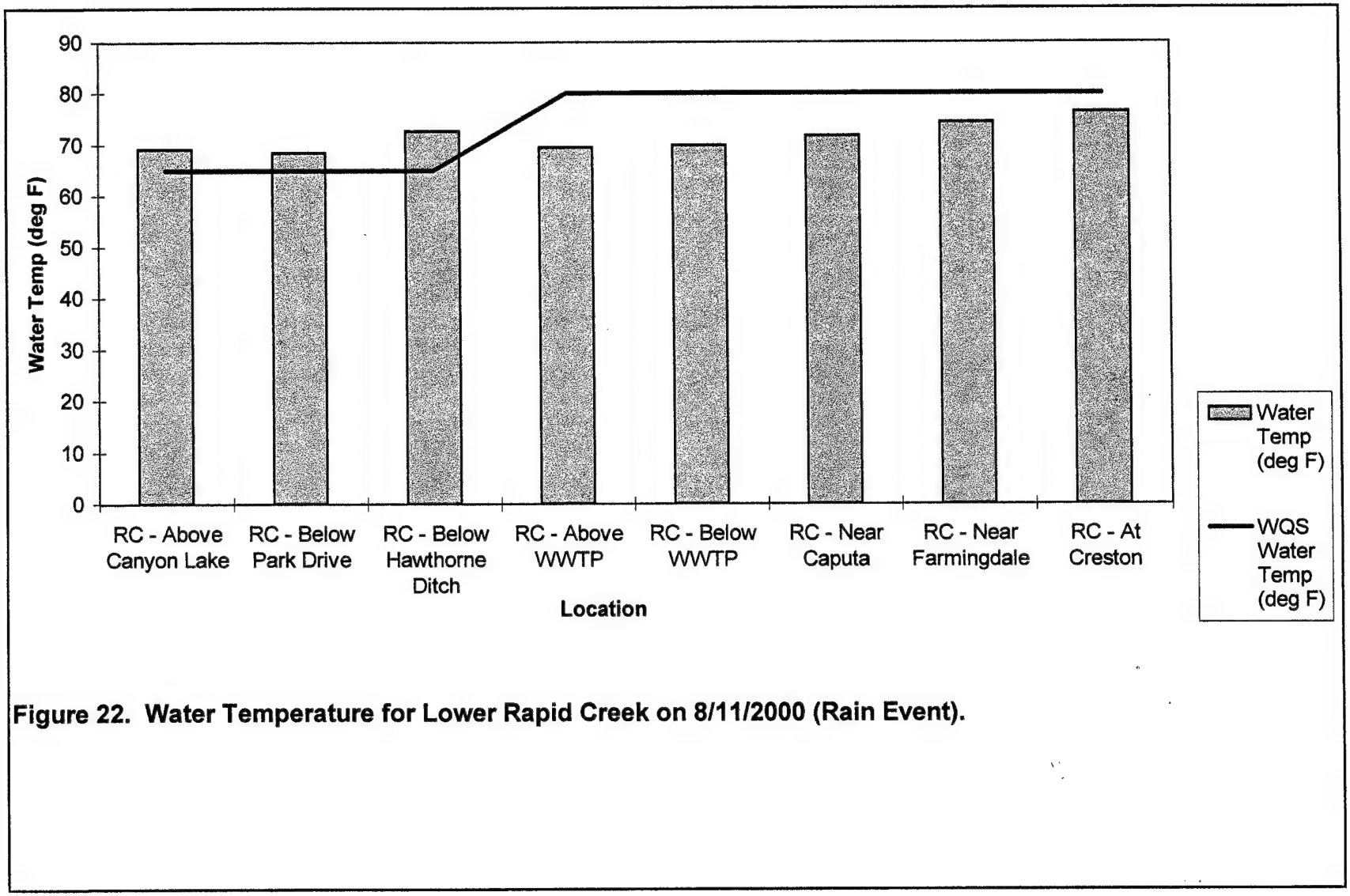

Figure 22. Water Temperature for Lower Rapid Creek on 8/11/2000 (Rain Event).

APPENDIX 3

Sample Date 4/21/2000 — Snow Melt Event

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)	% of WQS TSS Load	% Increase from Site to Site
RC - Above Canyon Lake	946	22287	4.2	0
RC - Below Park Drive	1310	30859	4.2	27.8
RC - Below Hawthorn Ditch	185259	69146	267.9	99.3
RC - Above WWTP	65663	247019	26.6	-182.1
RC - Near Caputa	278913	189949	146.8	76.5
RC - Near Farmingdale	1823996	371381	491.1	84.7
RC - At Creston	169043	342420	49.4	-979.0

Sample Date 4/25/2000 — Snow Melt Event

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)	% of WQS TSS Load	% Increase from Site to Site
RC - Above Canyon Lake	13931	38859	35.9	0
RC - Below Park Drive	2906	22001	13.2	-379.4
RC - Below Hawthorn Ditch	21737	54860	39.6	86.6
RC - Above WWTP	104921	224021	46.8	79.3
RC - Below WWTP	126636	247019	51.3	17.1
RC - Near Caputa	1304641	515333	253.2	90.3
RC - Near Farmingdale	4600683	951450	483.5	71.6
RC - At Creston	16076199	1192507	1348.1	71.4

Sample Date 5/9/2000 — Baseline

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)	% of WQS TSS Load	% Increase from Site to Site
RC - Above Canyon Lake	3574	37887	9.4	0
RC - Below Park Drive	6987	41145	17.0	48.8
RC - Below Hawthorn Ditch	8572	45431	18.9	18.5
RC - Above WWTP	13887	137138	10.1	38.3
RC - Below WWTP	16588	154174	10.8	16.3
RC - Near Caputa	56935	152471	37.3	70.9
RC - Near Farmingdale	133119	184498	72.2	57.2
RC - At Creston	525307	204430	257.0	74.7

Sample Date 6/28/2000 — Baseline

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)	% of WQS TSS Load	% Increase from Site to Site
RC - Above Canyon Lake	1092	25715	4.2	0
RC - Below Park Drive	1262	29716	4.2	13.5
RC - Below Hawthorn Ditch	3558	31430	11.3	64.5
RC - Above WWTP	19408	127769	15.2	81.7
RC - Below WWTP	31344	145656	21.5	38.1
RC - Near Caputa	82947	133731	62.0	62.2
RC - Near Farmingdale	96026	124361	77.2	13.6
RC - At Creston	117741	110733	106.3	18.4

Table 60. List of Total Suspended Solids (TSS) Samples Taken on Lower Rapid Creek That Violated Water Quality Standards.

Sample Date 8/3/2000 Baseline

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)	% of WQS TSS Load	% Increase from Site to Site
RC - Above Canyon Lake	807	19001	4.2	0
RC - Below Park Drive	2210	23430	9.4	63.5
RC - Below Hawthorn Ditch	4151	22001	18.9	46.8
RC - Above WWTP	21349	51107	41.8	80.6
RC - Below WWTP	28384	68995	41.1	24.8
RC - Near Caputa	28896	57070	50.6	1.8
RC - Near Farmingdale	39821	79642	50.0	27.4
RC - At Creston	154923	79217	195.6	74.3

Sample Date 8/11/2000 Rain Event

Sample Site	TSS Load (Lb/day)	WQS TSS Load for B.Uses #2 and #4 (Lb/day)	% of WQS TSS Load	% Increase from Site to Site
RC - Above Canyon Lake	643	15144	4.2	0
RC - Below Park Drive	15802	13086	120.8	95.9
RC - Below Hawthorn Ditch	931579	85718	1086.8	98.3
RC - Above WWTP	12572	37479	33.5	-7310.0
RC - Below WWTP	16064	54004	29.7	21.7
RC - Near Caputa	35905	63033	57.0	55.3
RC - Near Farmingdale	2491	13118	19.0	-1341.4
RC - At Creston	3100	21295	14.6	19.6

Table 60. List of Total Suspended Solids (TSS) Samples Taken on Lower Rapid Creek That Violated Water Quality Standards.

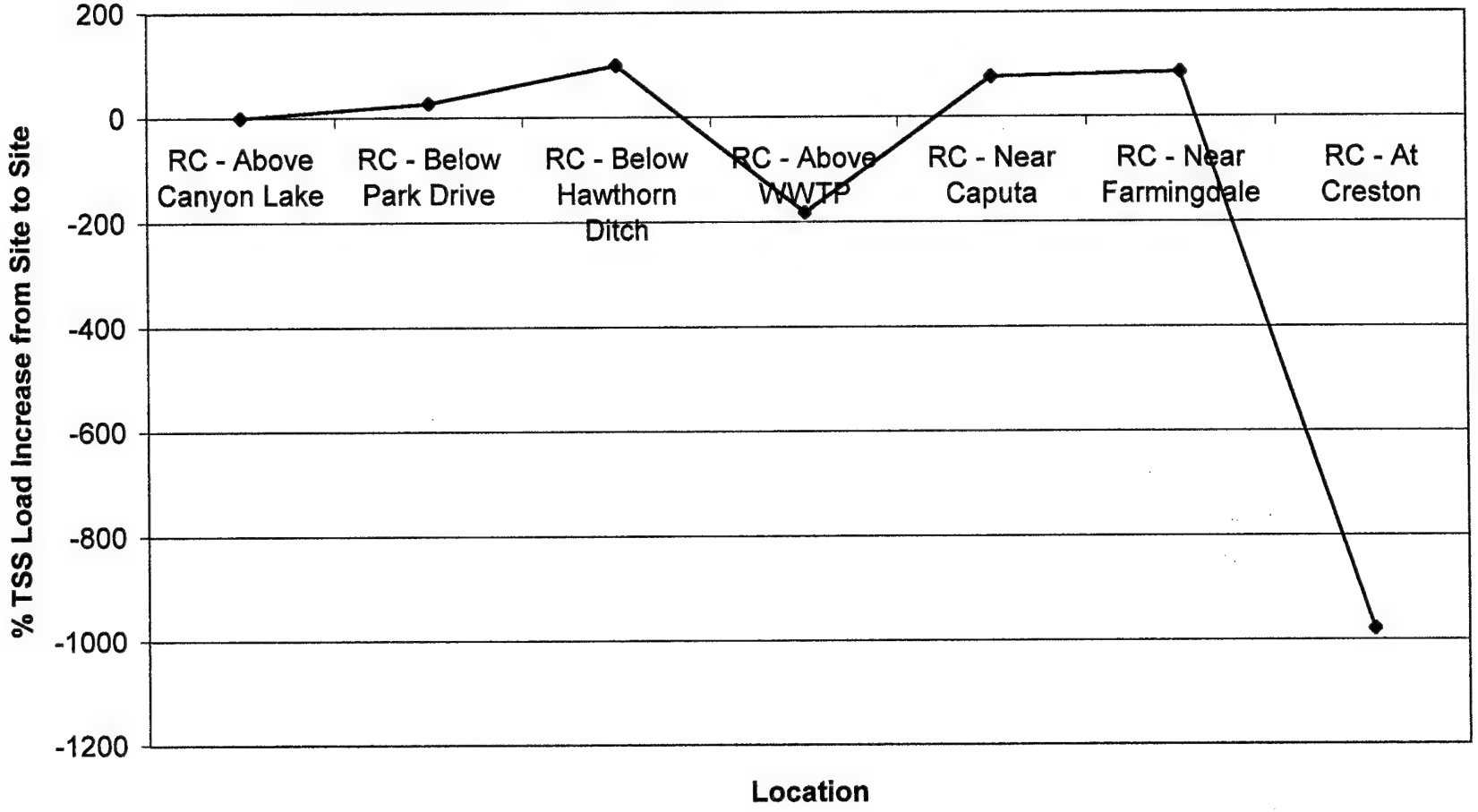

Figure 62. Total Suspended Solids Load % Increase from Site to Site for Lower Rapid Creek on 4/21/2000 (Snow Melt Event).

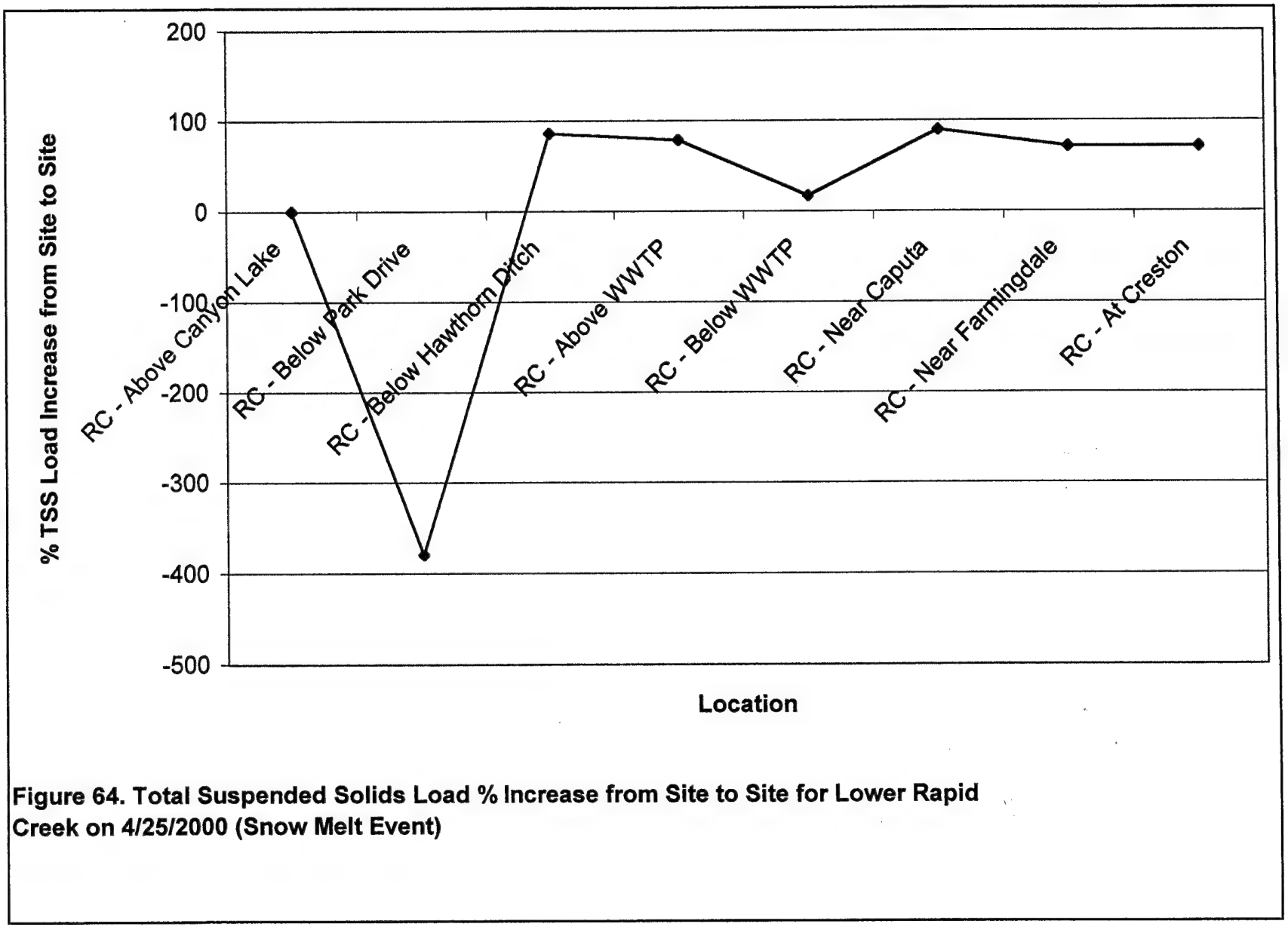

Figure 64. Total Suspended Solids Load % Increase from Site to Site for Lower Rapid Creek on 4/25/2000 (Snow Melt Event)

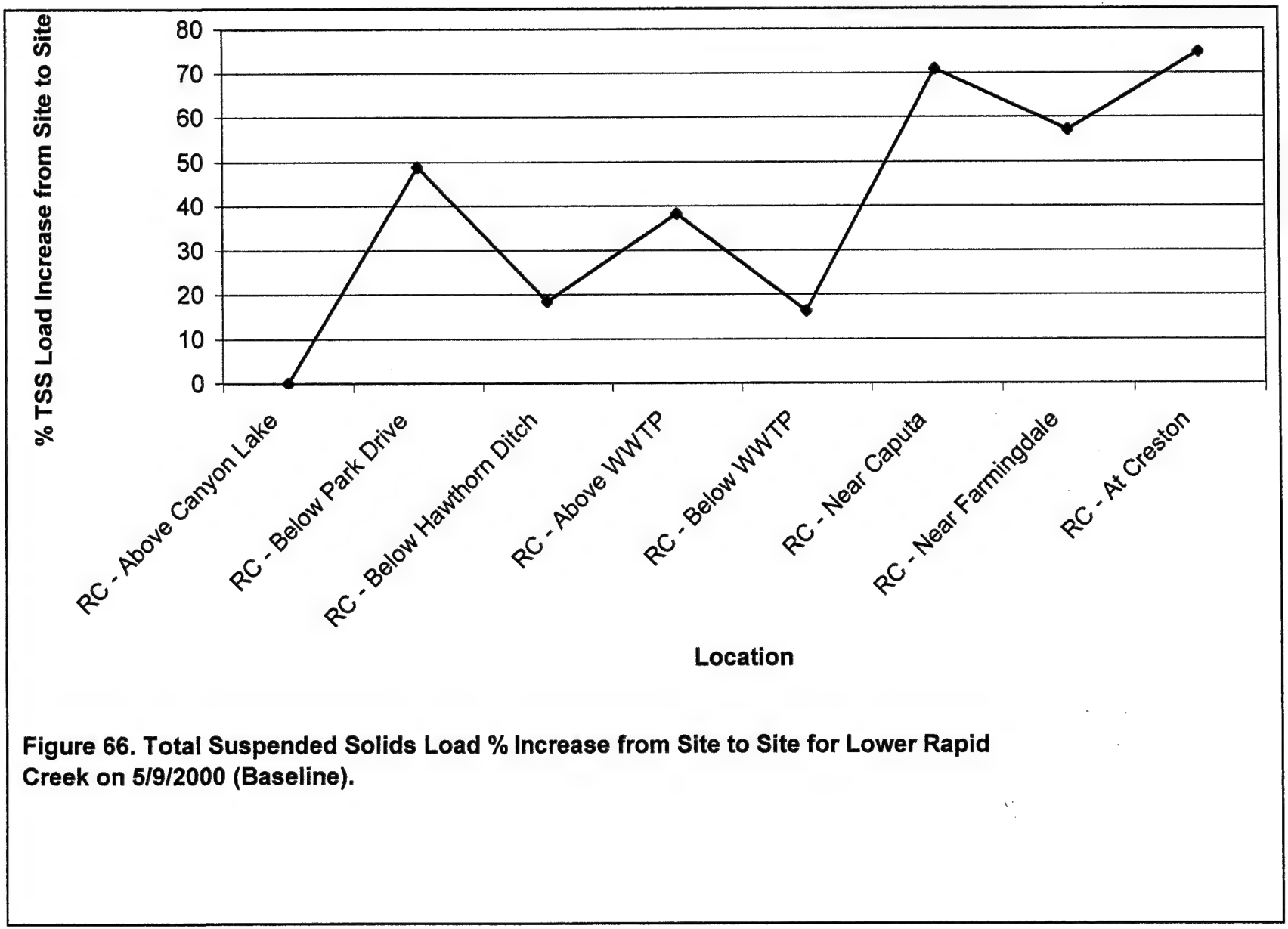

Figure 66. Total Suspended Solids Load % Increase from Site to Site for Lower Rapid Creek on 5/9/2000 (Baseline).

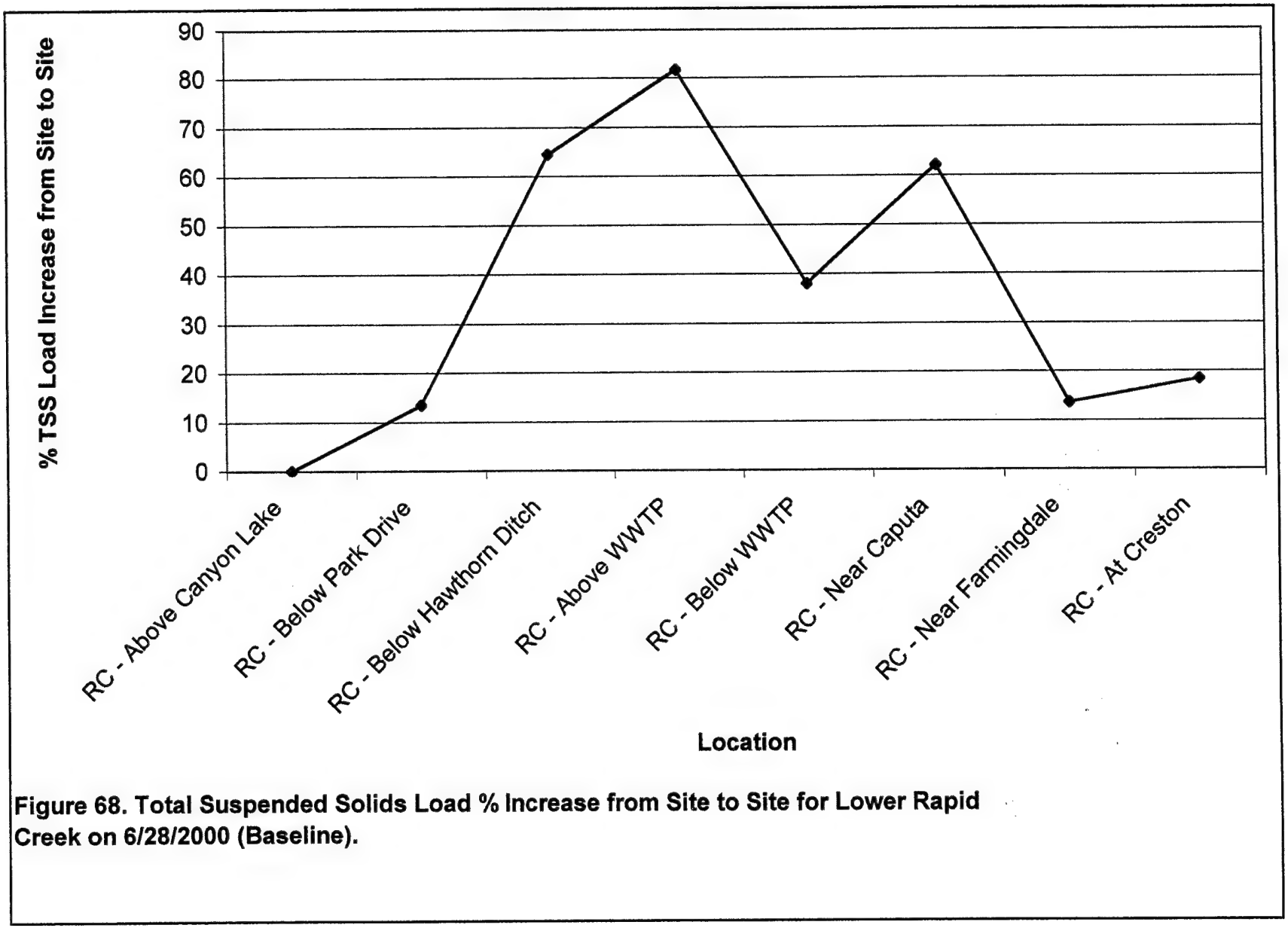

Figure 68. Total Suspended Solids Load % Increase from Site to Site for Lower Rapid Creek on 6/28/2000 (Baseline).

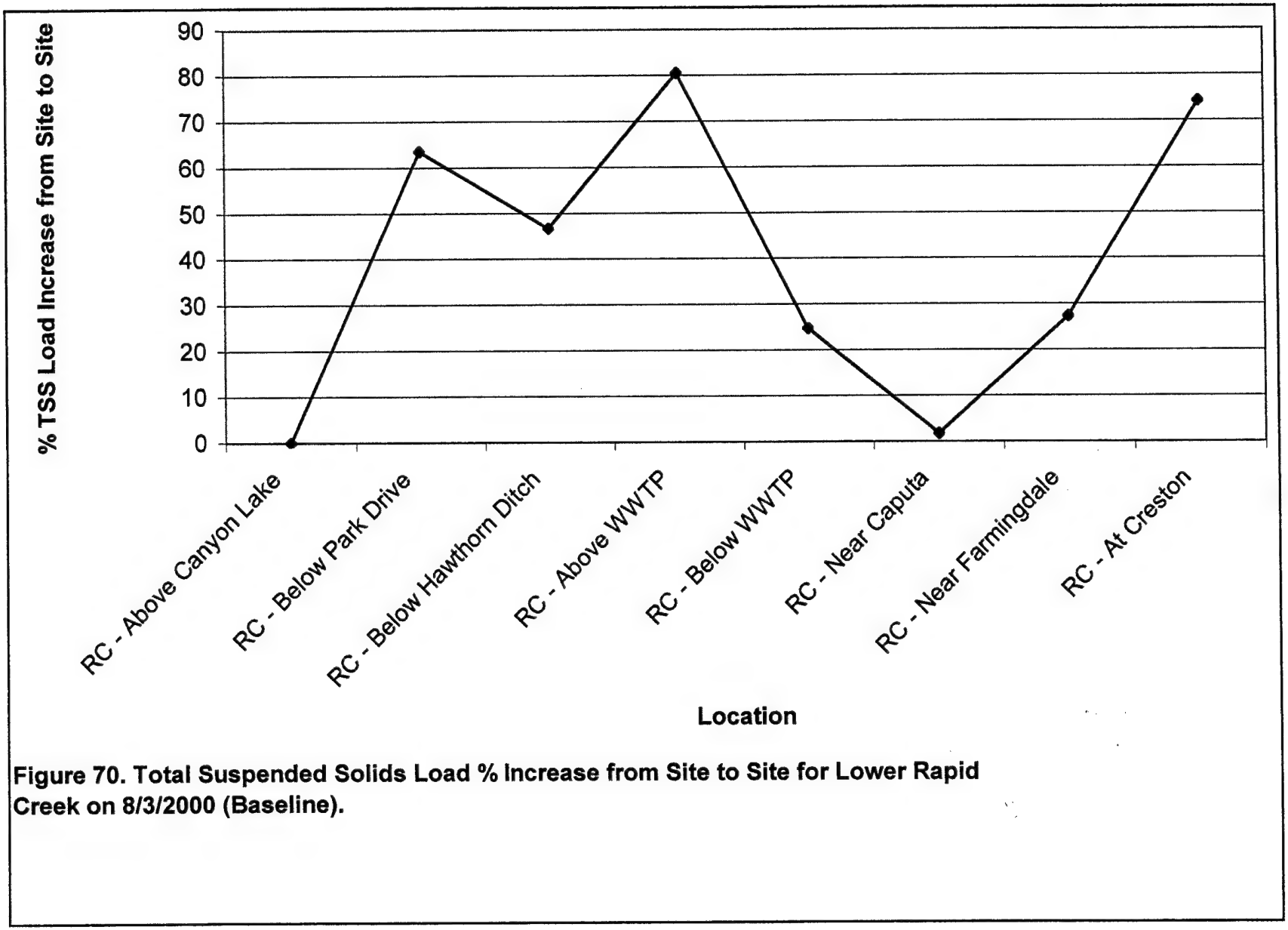

Figure 70. Total Suspended Solids Load % Increase from Site to Site for Lower Rapid Creek on 8/3/2000 (Baseline).

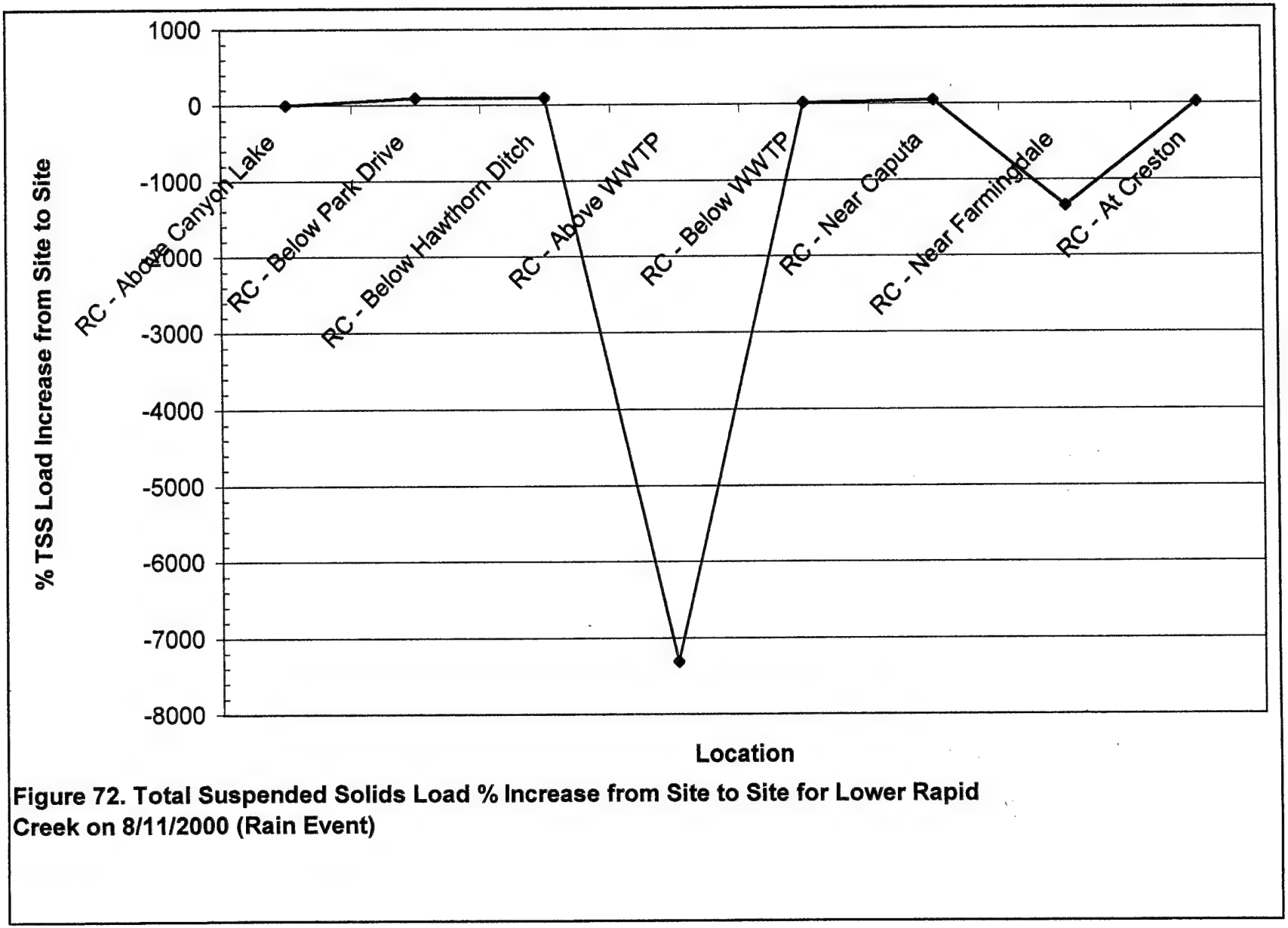

Figure 72. Total Suspended Solids Load % Increase from Site to Site for Lower Rapid Creek on 8/11/2000 (Rain Event)

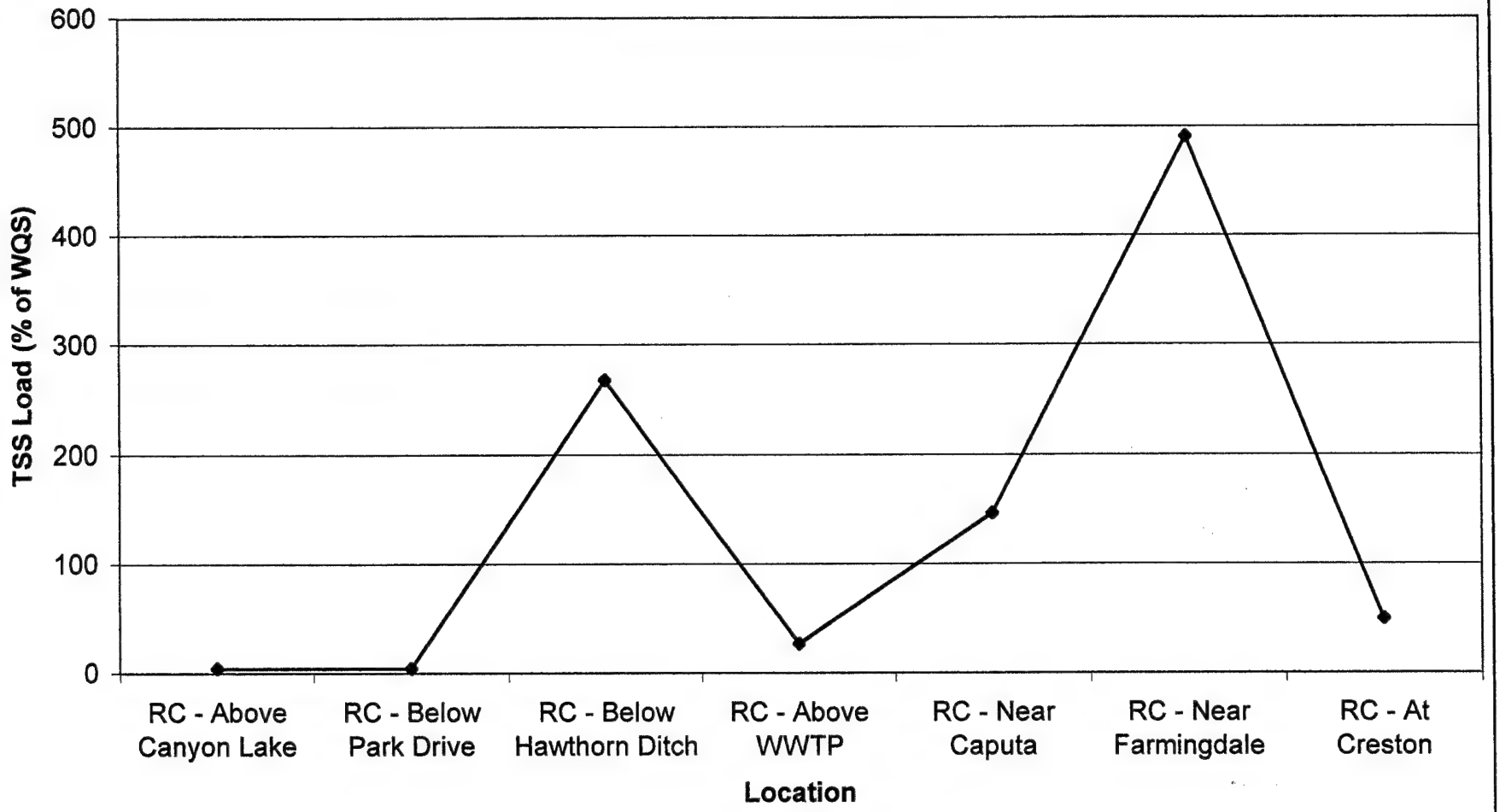

Figure 61. Total Suspended Solids Load for Lower Rapid Creek as a Percent of the Water Quality Standard Criteria on 4/21/2000 (Snow Melt Event).

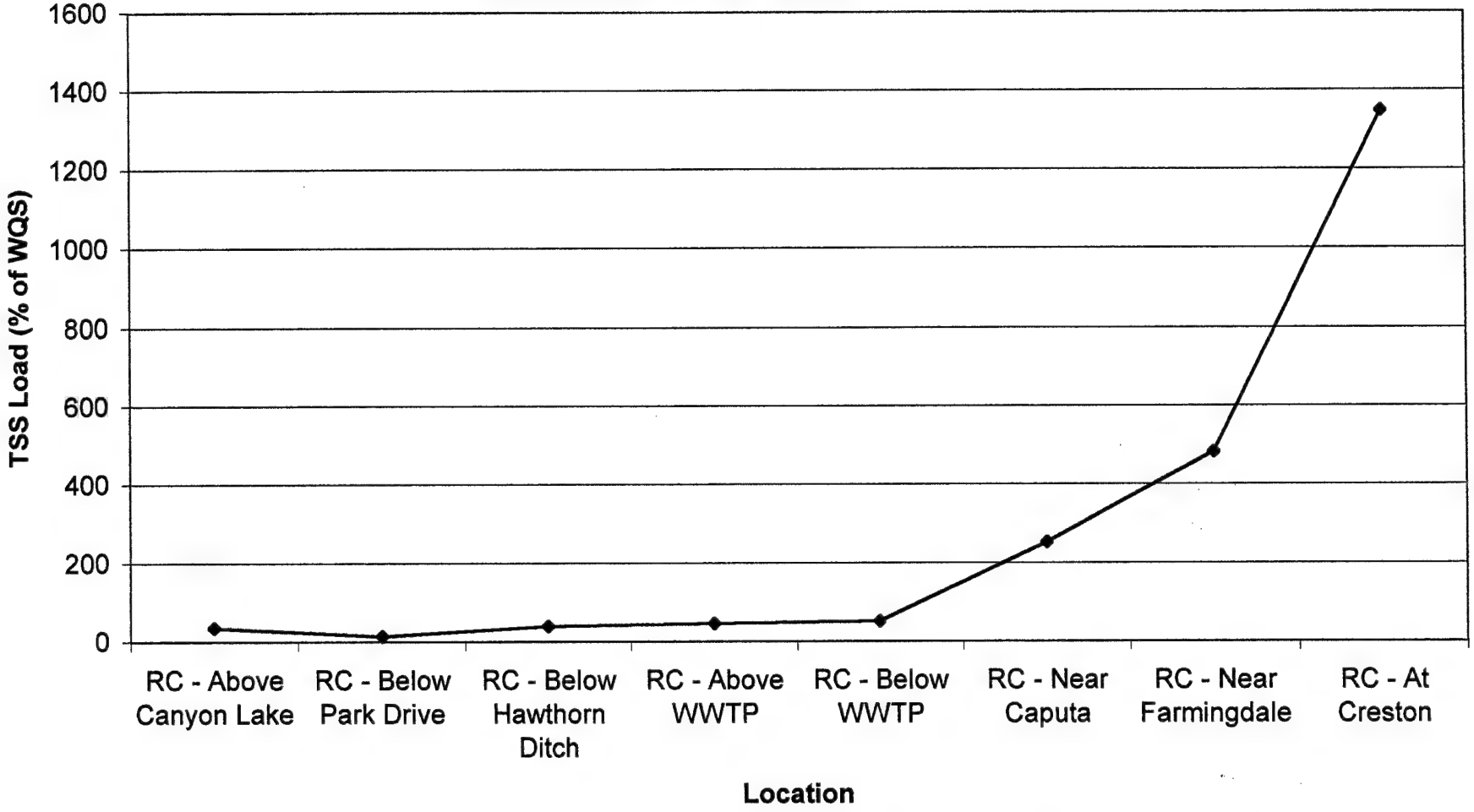

Figure 63. Total Suspended Solids Load as a % of the Water Quality Standard Criteria on 4/25/2000 (Snow Melt Event)

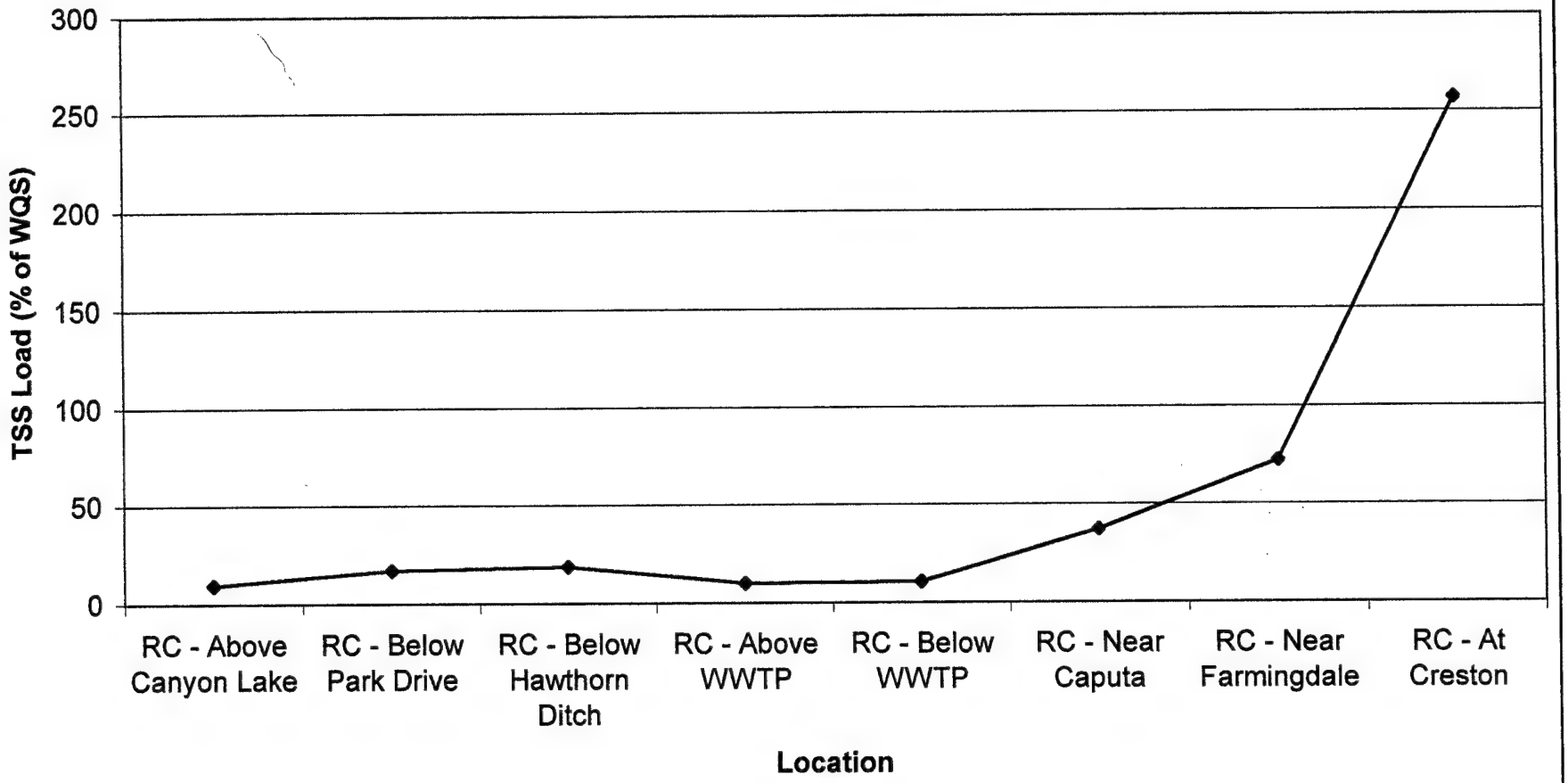

Figure 65. Total Suspended Solids Load for Lower Rapid Creek as a Percent of the Water Quality Standard Criteria on 5/9/2000 (Baseline).

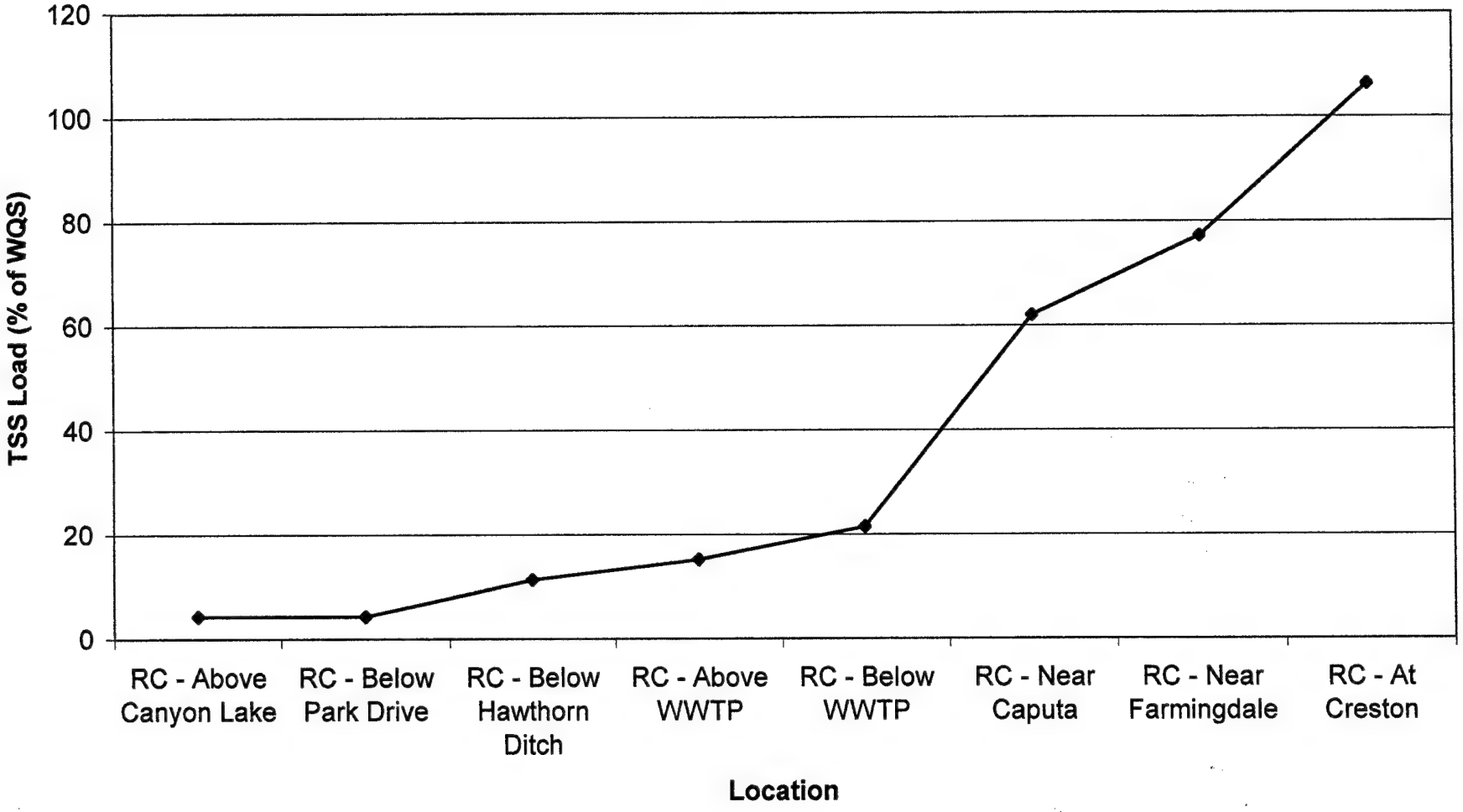

Figure 67. Total Suspended Solids Load for Lower Rapid Creek as a Percent of the Water Quality Standard Criteria on 6/28/2000 (Baseline).

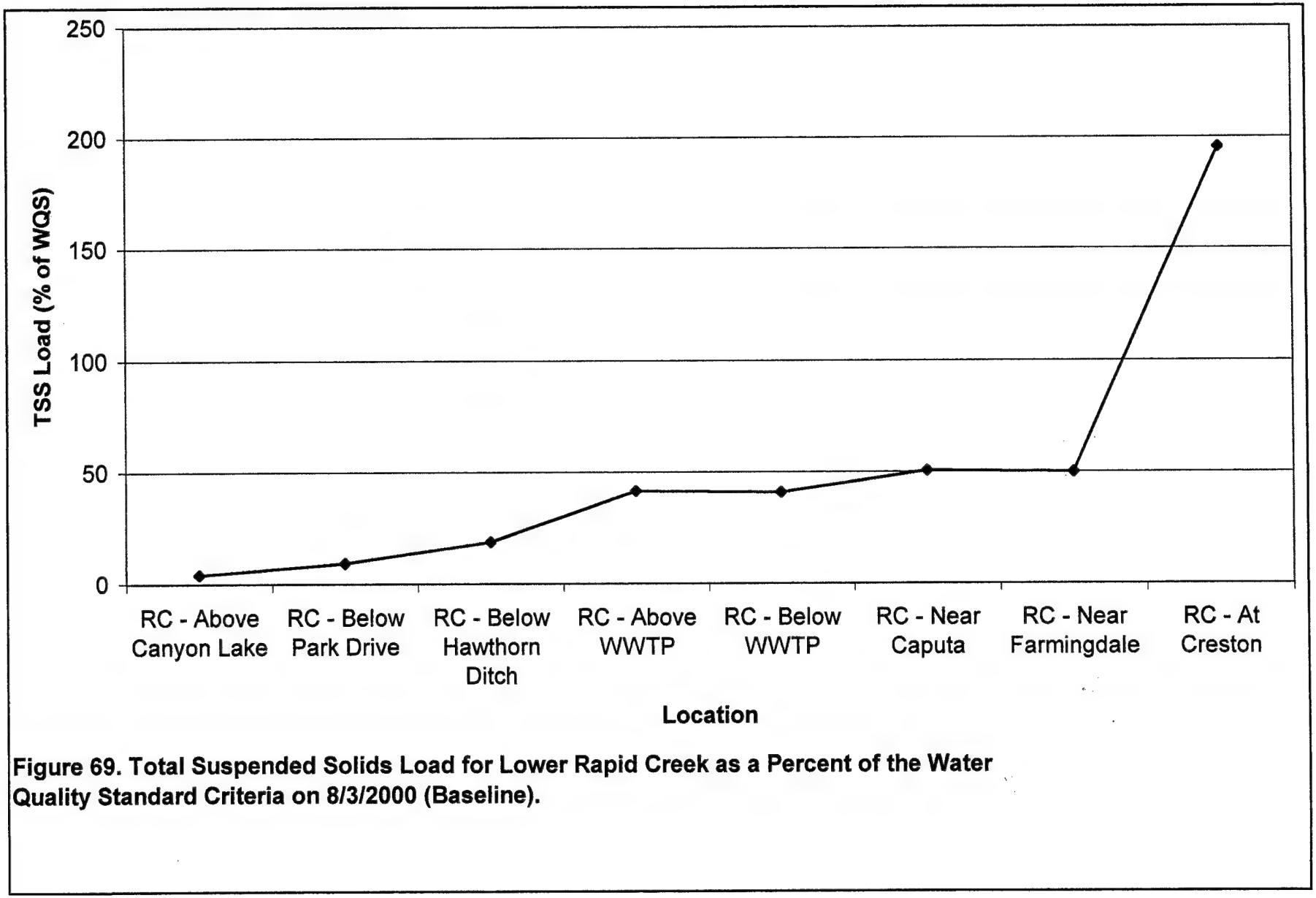

Figure 69. Total Suspended Solids Load for Lower Rapid Creek as a Percent of the Water Quality Standard Criteria on 8/3/2000 (Baseline).

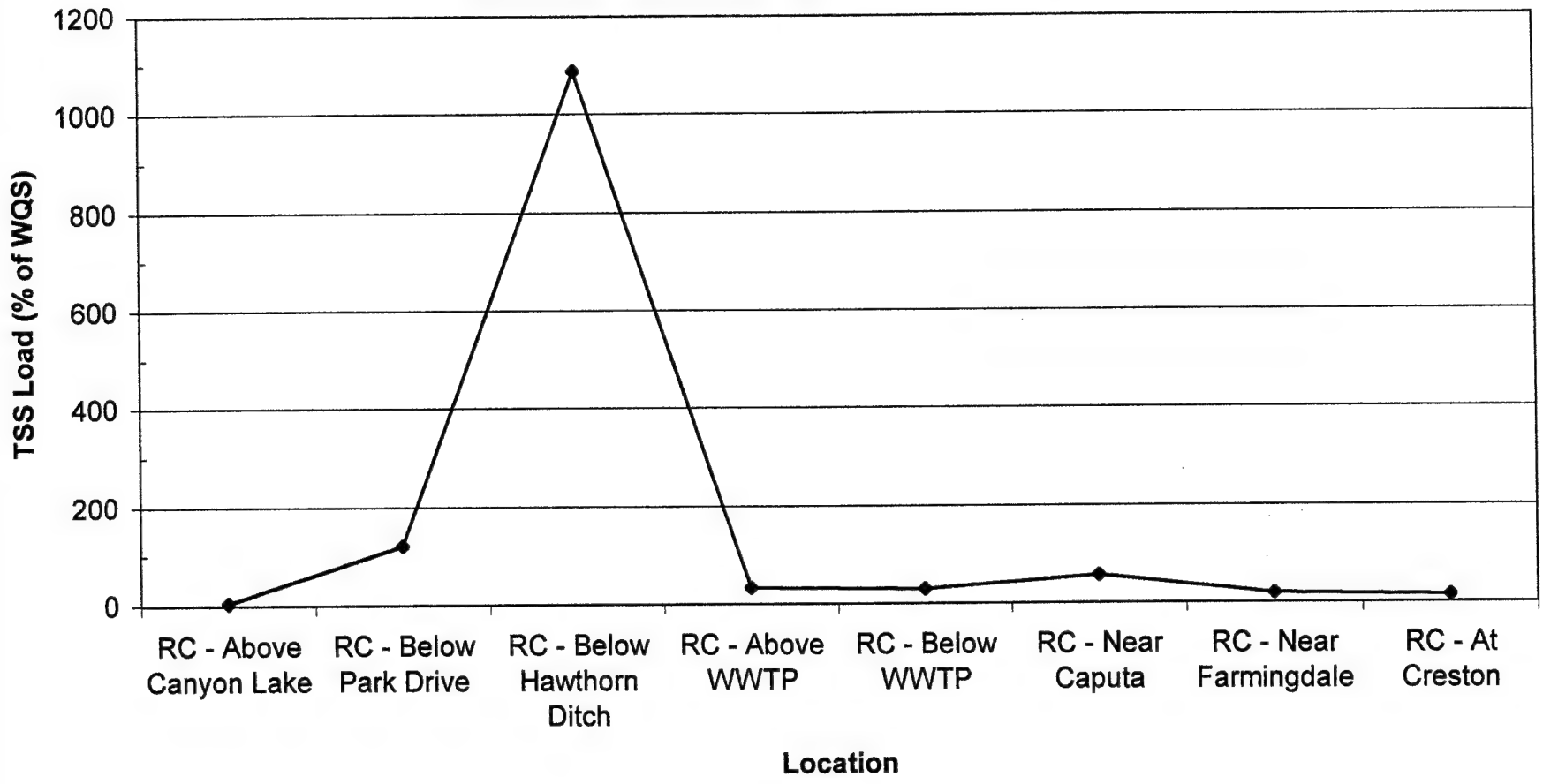

Figure 71. Total Suspended Solids Load for Lower Rapid Creek as a Percent of the Water Quality Standard Criteria on 8/11/2000 (Rain Event).

APPENDIX 4

	Date(s)								
	Flow / Time								
Location	9/1/99 9/2/99	10/6/99 10/7/99	10/27/99 10/28/99	11/17/99 11/18/99	12/14/99	1/5/00	2/1/00	2/29/00	3/28/00
Above Canyon Lake	174 0845	37.5 0830	28 0750	27 0830	77 1000	68 0815	46 0835	62 0810	62 0750
Below Park Drive	177 1215	56.7 0945	35 0855	38 0930	106 1100	91 0900	62 0935	80 0855	80 0900
Below Hawthorn Ditch	175 1345	58 1110	56 1120	55 1035	104 1205	90.5 1005	50 1035	90.5 0950	90.5 1000
Above WWTP	221 1535	64 1215	47 1240	48.5 1145	99 1255	113 1110	112 1205	101 1040	100 1100
Below WWTP	202 1615	81 1305	67 1320	64.5 1220	124 1335	119 1215	128 1250	120 1115	118 1135
Near Caputa	166 1200	70 1420	48 1415	60 1315	116 1430	116 1315	121 1400	95 1205	109 1245
Near Farmingdale	174 1330	77 1325	65 1520	75 1135	93 1515	112 1405	70 1455	100 1310	100 1325
At Creston	175 1310	81 1520	61 1015	58 1310	128 1600	146 1500	85 1600	96 1400	103 1440

	Date(s)							
	Flow / Time							
Location	4/21/00	4/25/00	5/9/00	6/28/00	8/3/00	8/11/00 8/12/00	8/31/00	11/1/00
Above Canyon Lake	78 1620	136 1510	132.6 0810	90 1425	66.5 0820	53 1805	52 1340	29 1210
Below Park Drive	108 1540	77 1435	144 0915	104 1345	82 0915	45.8 1815	42 1305	27 1145
Below Hawthorn Ditch	242 1435	192 1350	159 1020	110 1235	77 1000	300 1920	60 1155	166 1030
Above WWTP	290 1355	263 1335	161 1130	150 1040	60 1045	44 0905	36 1040	180 1255
Below WWTP	N/A	290 1250	181 1215	171 1125	81 1115	63.4 0930	54 1115	200 1310
Near Caputa	223 1230	605 1220	179 1320	157 0955	67 1245	74 1015	44.7 0945	150 1345
Near Farmingdale	436 1115	1117 1020	216.6 1415	146 0855	93.5 1330	15.4 1055	33 0905	96 1410
At Creston	402 0915	1400 0845	240 1445	130 0710	93 1410	25 1125	39 0810	100 1430

Table 90. Discharge Measurements (in cfs) Taken on Lower Rapid Creek.

	Date(s) / Flow Rates (cfs)								
Location	9/1/99 9/2/99	10/6/99 10/7/99	10/27/99 10/28/99	11/17/99 11/18/99	12/14/99	1/5/00	2/1/00	2/29/00	3/28/00
Above Canyon Lake	174	37.5	28	27	77	68	46	62	62
Below Park Drive	177	56.7	35	38	106	91	62	80	80
Below Hawthorn Ditch	175	58	56	55	104	90.5	50	90.5	90.5
Above WWTP	221	64	47	48.5	99	113	112	101	100
Below WWTP	202	81	67	64.5	124	119	128	120	118
Near Caputa	166	70	48	60	116	116	121	95	109
Near Farmingdale	174	77	65	75	93	112	70	100	100
At Creston	175	81	61	58	128	146	85	96	103

	Date(s) / Flow Rates (cfs)							
Location	4/21/00	4/25/00	5/9/00	6/28/00	8/3/00	8/11/00 8/12/00	8/31/00	11/1/00
Above Canyon Lake	78	136	132.6	90	66.5	53	52	29
Below Park Drive	108	77	144	104	82	45.8	42	27
Below Hawthorn Ditch	242	192	159	110	77	300	60	166
Above WWTP	290	263	161	150	60	44	36	180
Below WWTP	310	290	181	171	81	63.4	54	200
Near Caputa	223	605	179	157	67	74	44.7	150
Near Farmingdale	436	1117	216.6	146	93.5	15.4	33	96
At Creston	402	1400	240	130	93	25	39	100

Table 91. Flow Rate Measurements (in cfs) Taken on Lower Rapid Creek.

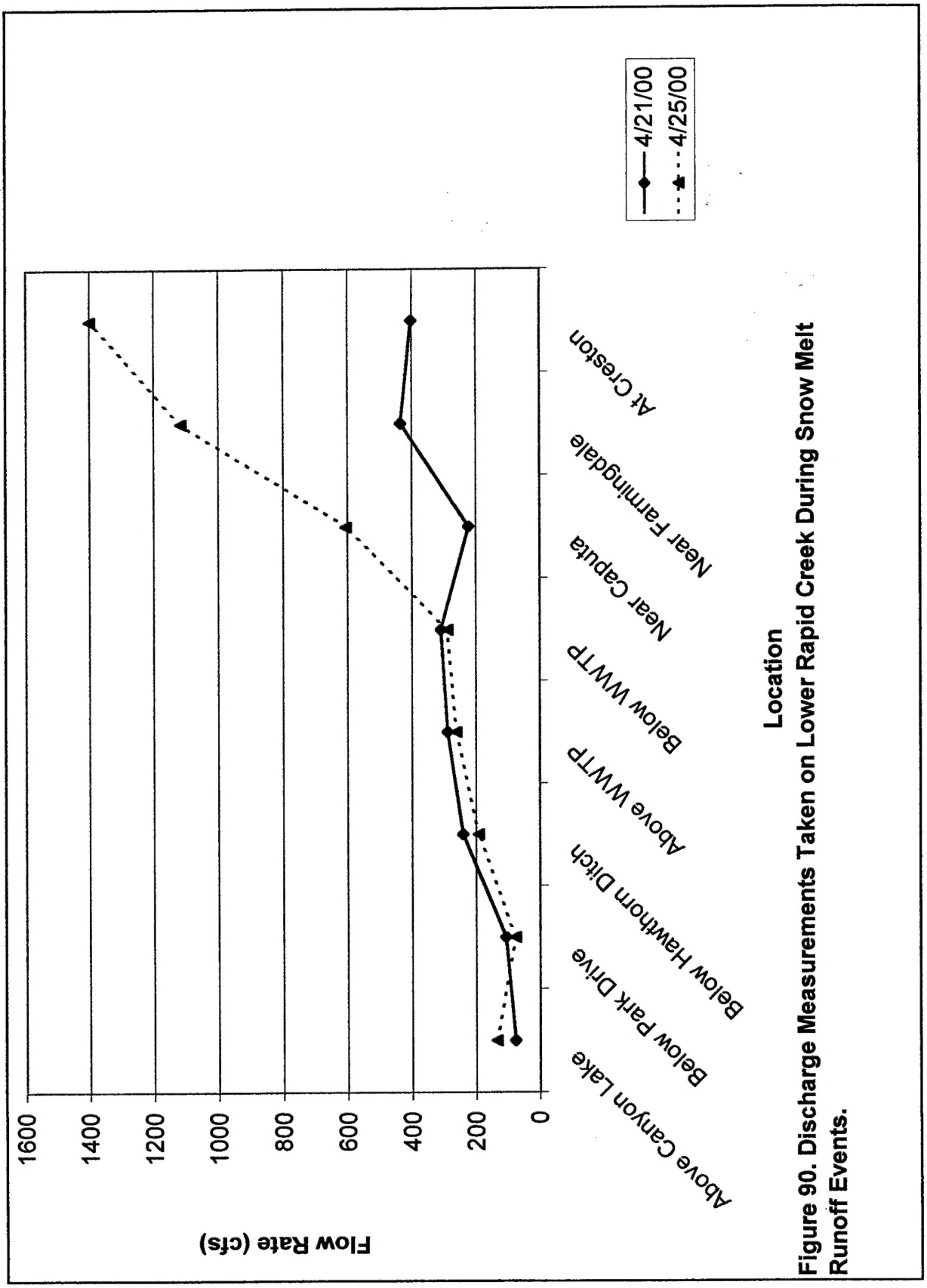

Figure 90. Discharge Measurements Taken on Lower Rapid Creek During Snow Melt Runoff Events.

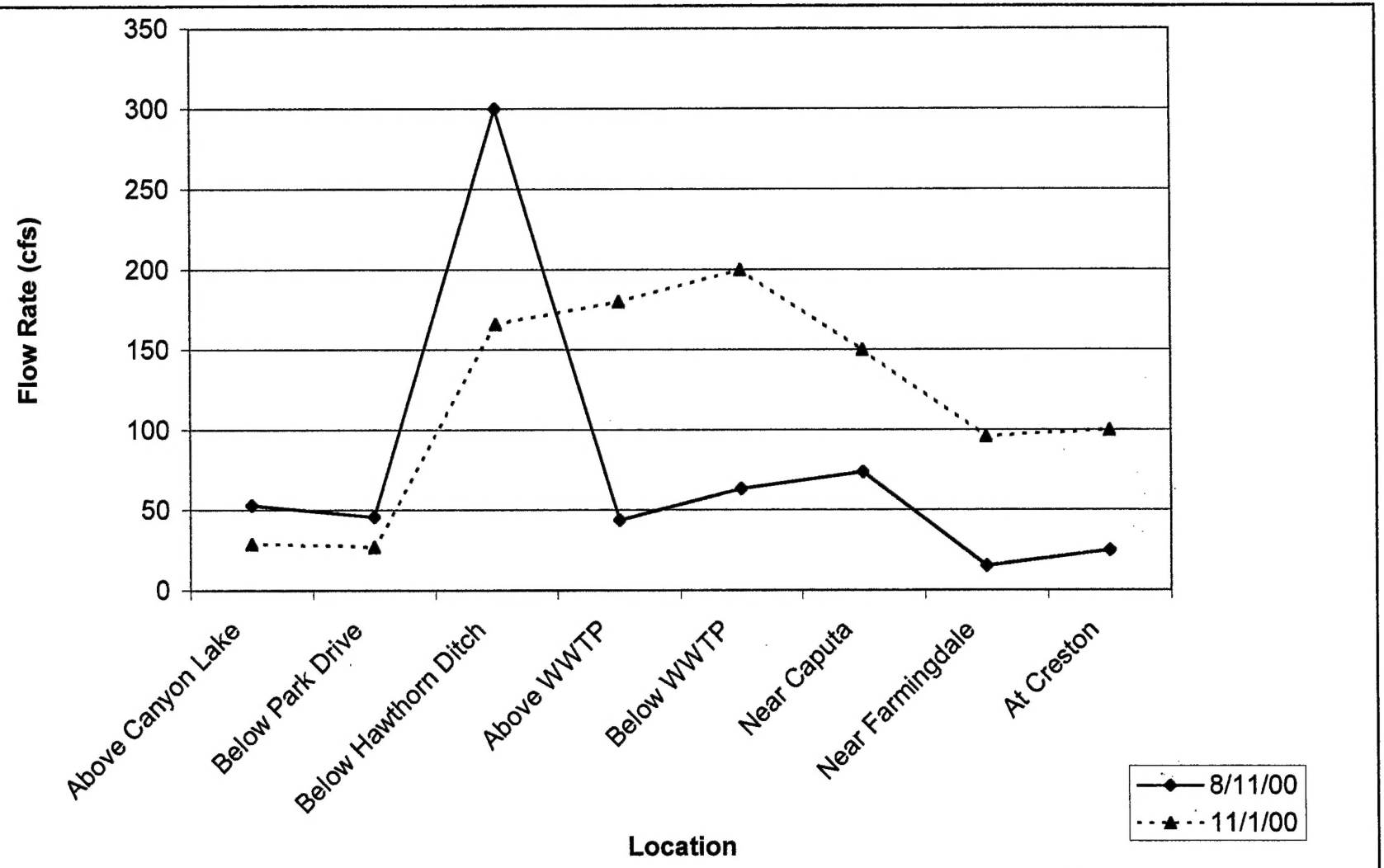

Figure 91. Discharge Measurements Taken on Lower Rapid Creek During Rainfall Runoff Events.

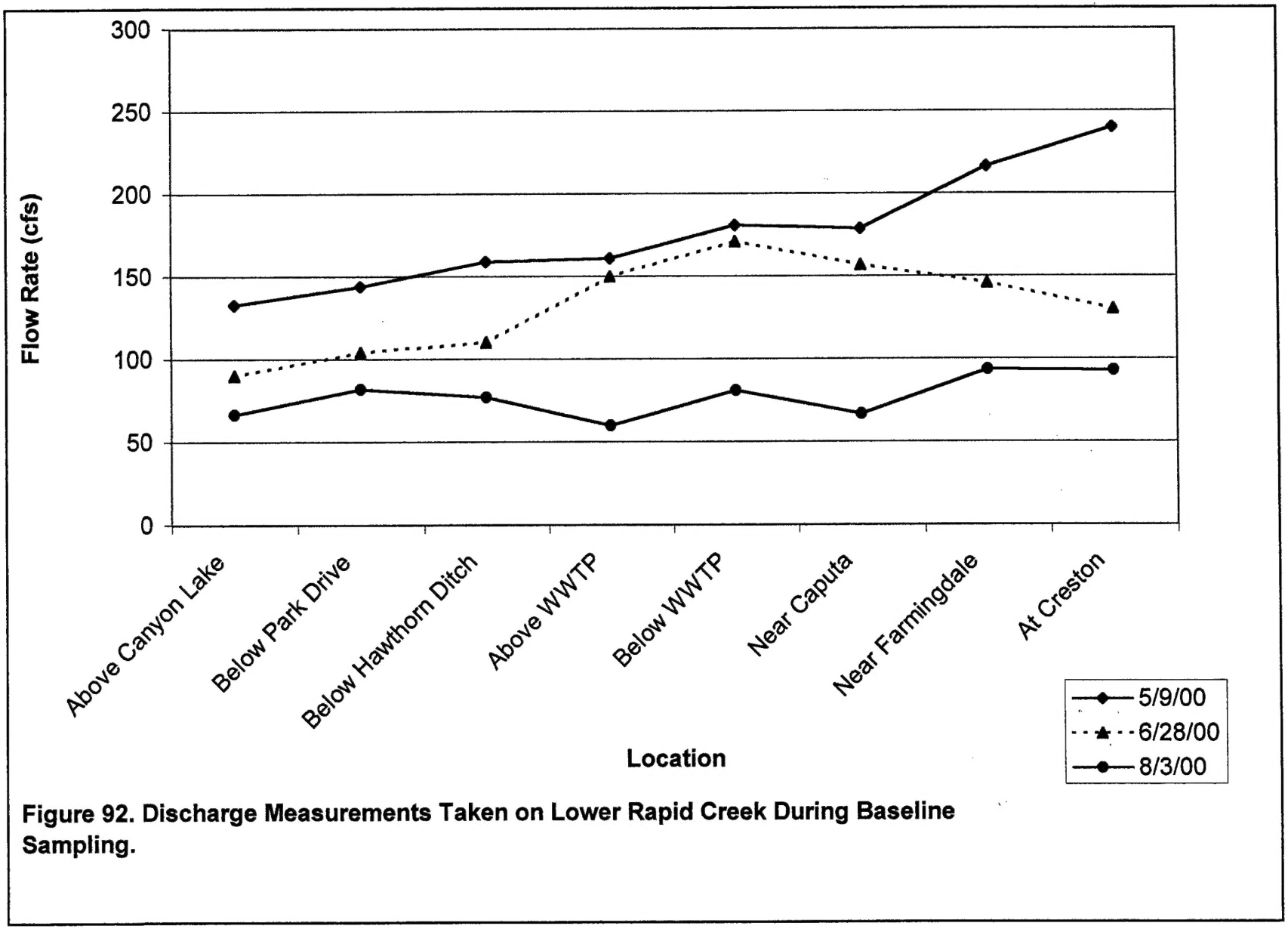

Figure 92. Discharge Measurements Taken on Lower Rapid Creek During Baseline Sampling.